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"Exploring Vocabulary Acquisition in EFL Learners: Effective Teaching Strategies and the Role of Duolingo as an Extracurricular Tool"
A Case Study of High School Students in the City of Biskra

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Declaration

I, Hanine Mansouri, hereby declare that this dissertation presented for the purpose of obtaining a Master's degree in Sciences of Language is the product of my own efforts, and therefore all the contents of this dissertation are original except where references are made. I additionally certify that this work has not been submitted to any university or institution to obtain a degree or qualification.

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Dedication

In the name of Allah, the Most Gracious, the Most Merciful

This work is dedicated to my beloved mother, whose kindness and unwavering support have been a constant source of strength, and to my father, whose guidance and encouragement have shaped the person I am today. I am forever grateful for your love and prayers.

To my wonderful sisters and brother, and to all my family and friends—thank you for your endless encouragement, patience, and belief in me throughout this journey.

To my dear students, whose cooperation and warmth inspired and sustained my motivation—this is also for you.

A special thanks to the people of Gaza, whose resilience in the face of unimaginable hardship reminded me to remain steadfast and grateful. Your strength gave perspective to my struggles and pushed me to keep going.

Finally, to myself—for persevering through every challenge, for staying the course, and for never giving up.

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Abstract

This study examines vocabulary acquisition among Algerian high school learners of English as a Foreign Language (EFL), with a particular focus on the supplementary use of Duolingo as an extracurricular digital tool. A mixed-methods design was employed, incorporating vocabulary pre- and post-tests, structured questionnaires distributed to 51 students and 43 EFL teachers, and semi-structured interviews conducted with five teachers from diverse educational settings. The findings indicated a statistically significant improvement in vocabulary scores within the experimental group following one week of Duolingo use ($p = .009$). However, comparisons between the experimental and control groups did not yield significant differences ($p = .170$), suggesting a limited impact in distinguishing Duolingo's effect from traditional instruction alone. Students reported high motivation and engagement, with 82.5% indicating prior experience with Duolingo and 77.5% responding positively to its gamified elements. While traditional tools like flashcards were rated highly, multimedia-based strategies were used more frequently. Teachers generally expressed familiarity with Duolingo but noted low student usage and voiced concerns regarding its limited focus on productive skills and partial alignment with curriculum objectives. Thematic analysis underscored student preferences for interactive and varied learning, as well as teachers' emphasis on contextual and communicative approaches. Key challenges included inconsistent digital access and a lack of training. The study concludes that Duolingo, when integrated thoughtfully within communicative classroom practices, can support vocabulary learning and student motivation.

Keywords: vocabulary acquisition, Duolingo, EFL learners, mobile-assisted learning, gamified instruction.

List of acronyms

- EFL:** English as a Foreign Language
- ELT:** English Language Teaching
- L1:** First Language / Native Language
- L2:** Second Language / Target Language
- CALL:** Computer-Assisted Language Learning
- MALL:** Mobile-Assisted Language Learning
- ICT:** Information and Communication Technology
- ESP:** English for Specific Purposes
- PPP:** Presentation, Practice, Production
- TPR:** Total Physical Response
- CLT:** Communicative Language Teaching
- XP:** Experience Points (used in gamified apps like Duolingo)
- SLA:** Second Language Acquisition
- SD:** Standard Deviation
- TEFL:** Teaching English as a Foreign Language
- TL:** Target Language
- FL:** Foreign Language
- ESL:** English as a Second Language
- ZPD:** Zone of Proximal Development

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General introduction

1. Background of the study

Vocabulary acquisition is a foundational component of English as a Foreign Language (EFL) learning. It plays a crucial role in developing learners' language proficiency across reading, writing, listening, and speaking skills. As emphasized by Nation (2001), a well-developed vocabulary is key to both language fluency and comprehension. Similarly, Schmitt (2008) and Thornbury (2022) highlight that a rich lexicon enhances learners' communicative competence and academic success. In the Algerian context, EFL learners—particularly in public high schools—often encounter considerable challenges in vocabulary learning. These include difficulties in retaining new words, using them appropriately in context, and transferring them into active use. The problem is further compounded by the limited availability of extracurricular learning tools and the minimal exposure to English outside the classroom, a situation echoed in the findings of Laufer (2000) and Hulstijn (2001). These limitations make it difficult for students to reinforce vocabulary acquisition through real-life language practice. Classroom practices in Algerian public schools still rely heavily on traditional methods such as rote memorization and vocabulary lists. Although these methods may assist in short-term recall, they frequently fall short in promoting deep, contextualized understanding (Carter & McCarthy, 1988; Folse, 2004). Additionally, a lack of learner-centered instruction and interaction-oriented activities can lead to disengagement and insufficient vocabulary retention. Global trends in language pedagogy point to the need for dynamic and learner-centered strategies, including task-based learning, collaborative projects, extensive reading, and multimedia-enhanced instruction (Nation, 2013; Webb, 2008). These approaches prioritize active engagement and contextual learning, which are essential for meaningful vocabulary development. Mobile-Assisted Language Learning (MALL) has recently emerged as a potential solution to support vocabulary acquisition beyond the classroom. Duolingo, a widely used gamified mobile application, offers interactive exercises, immediate feedback, and repeated exposure to vocabulary in contextualised formats. Research by Vesselinov and Grego (2012) and Shortt et al. (2021) suggests that such tools can significantly enhance vocabulary retention and learner motivation. In Algeria, the integration of digital tools like Duolingo remains limited, especially in public schools where internet access, digital infrastructure, and pedagogical training may be lacking. Nevertheless, the accessibility and learner autonomy offered by

Duolingo present an opportunity to bridge the gap between classroom instruction and independent learning. The motivation behind this study is rooted in the researcher's personal experience, both as a former Algerian EFL learner who struggled with vocabulary acquisition and as a current EFL teacher in an Algerian public school. These experiences underscore the urgent need for more effective and engaging vocabulary instruction that extends beyond classroom boundaries.

2. Statement of the problem

Vocabulary acquisition remains one of the most persistent challenges facing Algerian EFL learners, particularly at the secondary education level. Despite its central role in supporting all four-language skills, vocabulary is often taught through traditional, teacher-centred approaches, such as rote memorisation and static word lists. These strategies may result in superficial recall but do not promote the depth of understanding or practical usage that learners require to develop fluency and confidence in communication. As Saihi (2013) noted, students at Biskra University continue to struggle with cohesive and coherent writing due in part to limited vocabulary resources and insufficient synonymy knowledge. Moreover, learners in Algerian public schools face restricted access to digital language tools and extracurricular resources that could otherwise enhance and extend vocabulary practice beyond the classroom. As highlighted by Benzitouni (2016), although tools such as dictionaries can be beneficial in vocabulary learning, their use is minimal and often underutilized in Algerian educational settings. This technological gap limits learners' opportunities for autonomous learning and real-life vocabulary application. In recent years, Mobile-Assisted Language Learning (MALL) has emerged as a promising avenue for bridging this gap. Applications such as Duolingo offer gamified and interactive experiences that encourage learners to practice vocabulary in context, with features like spaced repetition, instant feedback, and personalised learning paths. However, despite its widespread global adoption, Duolingo remains underexplored in Algerian secondary school contexts, particularly as an extracurricular support tool. The researcher's own experiences as an EFL learner and teacher in Algeria provide firsthand insight into these challenges. Like many students in the public school system, the researcher struggled with vocabulary acquisition due to the lack of engaging, accessible tools and insufficient practice opportunities outside classroom hours. Now, as an educator, similar patterns of vocabulary difficulties are observed among students, reinforcing the urgency to find innovative and contextualized solutions. This study aims to investigate how effective teaching strategies, when combined with the use of

Duolingo as an extracurricular tool, can improve vocabulary acquisition among Algerian EFL learners. It seeks to address the need for context-rich, learner-centered vocabulary instruction that extends beyond the traditional classroom, leveraging digital tools to enhance learner autonomy and motivation in under-resourced environments such as Algerian public schools.

3. Research questions

To address the identified challenges and objectives, the study seeks to answer the following research questions:

1. What effective teaching strategies can enhance vocabulary acquisition among Algerian high school EFL learners?
2. How does the use of Duolingo as an extracurricular tool affect vocabulary retention and application among Algerian high school EFL learners in the context of limited classroom exposure?
3. In what ways do interactive and gamified learning experiences influence student engagement and motivation in vocabulary learning?
4. What are the perceptions of Algerian high school EFL learners regarding the effectiveness of Duolingo compared to traditional vocabulary learning methods?
5. How do traditional vocabulary learning strategies (e.g., flashcards, word maps, context-based instruction) interact with the use of Duolingo to influence vocabulary acquisition outcomes?
6. What challenges do Algerian high school EFL learners face when using Duolingo for vocabulary acquisition, and how can these challenges be addressed through effective teaching strategies?

4. Research hypotheses

Based on the research questions, the following hypotheses are proposed:

1. The integration of interactive teaching strategies, such as collaborative learning, context-based instruction, and multimedia use, will significantly improve vocabulary acquisition among Algerian high school EFL learners compared to traditional rote memorization techniques.
2. There is a positive correlation between the frequency of Duolingo use and improved vocabulary retention and application among Algerian EFL learners.
3. Algerian EFL learners exposed to interactive and gamified learning environments through Duolingo are expected to demonstrate higher levels of motivation and

interest in vocabulary learning compared to those relying solely on traditional methods.

4. Students' attitudes toward Duolingo will be more favorable than their attitudes toward traditional vocabulary learning methods, reflecting a preference for technology-based learning.

5. The combined use of Duolingo with traditional vocabulary strategies (e.g., flashcards, context-based learning) will lead to better vocabulary acquisition outcomes than using either approach in isolation.

6. Algerian EFL learners will encounter specific challenges while using Duolingo, and these can be mitigated through targeted instructional support and adaptation of classroom strategies.

5. Research aims

This study aims to:

- Investigate effective teaching strategies that enhance vocabulary acquisition among Algerian high school EFL learners.
- Explore the impact of Duolingo as an extracurricular support tool on vocabulary retention and application.
- Examine how interactive and gamified learning experiences influence student engagement and motivation in vocabulary learning.
- Understand students' perceptions of Duolingo's effectiveness in comparison to traditional vocabulary learning methods.
- Identify challenges Algerian learners face when using Duolingo and propose practical instructional strategies to overcome them.

6. Research methodology

This study integrates both qualitative and quantitative methods to comprehensively explore vocabulary acquisition among Algerian EFL learners. Semi-structured interviews will be conducted with EFL teachers from public schools, selected through purposive sampling. These interviews aim to explore teachers' instructional strategies, perceptions of Duolingo, and insights into the specific challenges learners face in acquiring vocabulary. A structured questionnaire will also be distributed to a broader sample of 30 to 50 EFL learners and 30 to 50 teachers. The questionnaire will include a mix of closed-ended, open-ended, Likert-scale, multiple-choice questions designed to capture participants' attitudes toward Duolingo, frequency of use, preferred vocabulary learning methods, and perceptions of its effectiveness.

compared to traditional approaches. This combination of tools ensures data triangulation and provides a rich contextual understanding of how technology may enhance vocabulary acquisition in Algerian classrooms. To complement these methods, an experimental component will be included. A group of 10 to 15 EFL learners will participate in a one-week Duolingo-based vocabulary learning intervention. Participants will be asked to use Duolingo for a minimum of 3 minutes per day over seven consecutive days, focusing on vocabulary-related activities. To assess the impact of this intervention, a vocabulary pre-test will be administered before the learners begin using Duolingo. The pre-test will consist of 30 items measuring both receptive (e.g., multiple-choice synonym recognition) and productive (e.g., fill-in-the-blank or short answer) vocabulary knowledge, aligned with common high-frequency English words typically taught at the A2-B1 CEFR levels. At the end of the intervention, a post-test using the same or parallel items (with similar difficulty and structure) will be conducted to measure vocabulary gains. The tests will be piloted beforehand to ensure reliability and validity. For analysis, descriptive statistics (mean scores, standard deviation) will summarize learner performance on the pre- and post-tests. A paired-samples t-test will be used to determine whether the observed changes in vocabulary knowledge are statistically significant. Additionally, qualitative observations from learner feedback may be collected to understand their engagement and perceived usefulness of Duolingo. By integrating interviews, questionnaires, and a short-term experimental component, this mixed-methods design aims to provide both breadth and depth in evaluating the effectiveness of Duolingo as a vocabulary learning tool for Algerian EFL learners.

6.1 Population, sampling, and sampling technique

The study targets two groups: Algerian EFL learners at the intermediate proficiency level (A2-B1 CEFR) and EFL teachers working in various educational settings. The teacher population includes any instructors involved in teaching English as a foreign language, regardless of the educational level or institution type.

For the quantitative component, 10 to 15 EFL learners will be selected to participate in the vocabulary pre-test and post-test following a one-week use of Duolingo. Additionally, a larger sample of 30 to 50 EFL learners and 30 to 50 EFL teachers will be surveyed to gather data on attitudes and perceptions regarding Duolingo and vocabulary acquisition. For the qualitative component, 5 to 10 EFL teachers from diverse educational contexts (such as secondary schools, language institutes, or private tutoring centers) will be purposively selected for semi-structured interviews. This ensures the inclusion of a broad range of

perspectives from teachers who may have different experiences and instructional environments. Purposive sampling will be used to select teachers for interviews, ensuring a variety of backgrounds and teaching contexts are represented. Convenience sampling will be employed for recruiting learners and teachers to participate in the surveys and vocabulary tests based on their availability and willingness. This sampling strategy enables the study to capture comprehensive insights from both learners and a wide spectrum of EFL teachers within Algeria.

Ethical considerations The researcher placed great importance on adhering to ethical standards throughout the study. Initially, a formal consent letter requesting permission to conduct the research was sent to the relevant educational authorities and institutions where the study participants are affiliated (see Appendix A). Approval was obtained before proceeding with any data collection.

Participants, including EFL learners and teachers, were contacted individually through appropriate channels, such as school communication platforms or social media groups, to seek their voluntary informed consent. This approach ensured that participation was completely voluntary and free from any pressure or coercion.

All participants were assured of their anonymity and the confidentiality of their responses. Personal identifying information was neither collected nor linked to the data, and all collected information was securely stored to protect participants' privacy. Furthermore, participants were informed that their data would only be used for the purposes of this research and that aggregated findings may be published in the final dissertation and shared with the academic community via the university's online data repository.

The study strictly adhered to the ethical guidelines and protocols established by Mohamed Khider University of Biskra and respected relevant international research ethics standards, ensuring the protection and respect of all participants throughout the research process.

7. The documentation style

The present study adhered to the seventh edition of the American Psychological Association (Hereafter APA) style of documentation. Abiding by the nature of Applied Linguistics stream, this documentation style was opted for. No institutional conventions or traditions that concern the documentation process were taken into application in writing this manuscript and no exceptions from the APA 7th edition were made.

8. Demystification of terms

To ensure clarity and consistency in this research, it is safer to demystify some key terminologies that will be used here by providing their operational definitions as follows:

- ***Vocabulary Acquisition***

The process by which learners understand, remember, and use new words and phrases in a language. In this study, the term 'learners' specifically refers to the ability of learners to acquire English vocabulary through both formal instruction and the use of the Duolingo platform as an extracurricular tool.

- ***Effective Teaching Strategies***

Instructional methods and techniques that significantly improve learners' vocabulary knowledge and language skills. These may include traditional classroom approaches as well as innovative practices incorporating technology such as mobile-assisted language learning.

- ***Mobile-Assisted Language Learning (MALL)***

The use of mobile technologies, such as smartphones and tablets, to support and enhance language learning. In this research, Duolingo is the primary example of a MALL tool used to facilitate vocabulary learning outside the classroom.

- ***Duolingo***

A widely used language learning application that provides gamified lessons focusing on vocabulary, grammar, listening, and speaking skills. Duolingo's lessons in this study emphasise initial vocabulary acquisition aligned with common high-frequency English words.

- ***Extracurricular Tool***

A widely any resource or activity used by learners outside of the formal classroom setting to support their language learning. Duolingo, as an extracurricular tool, supplements traditional teaching methods by offering additional practice opportunities.

9. Structure of the thesis

This study is organized into four main chapters. Chapter One provides a comprehensive literature review covering vocabulary acquisition theories, the specific challenges faced by Algerian EFL learners, and the role of mobile-assisted language learning (MALL) tools such as Duolingo in language education. Chapter Two outlines the research design and methodology, detailing the mixed-method approach, participant selection,

sampling techniques, data collection instruments including pre- and post-tests, interviews, and questionnaires, as well as procedures for data analysis. Chapter Three presents the results, combining quantitative data from the vocabulary tests with qualitative insights gathered from teacher interviews and learner questionnaires, to examine the effectiveness of Duolingo and teaching strategies on vocabulary acquisition. Finally, Chapter Four discusses the findings in the context of Algerian EFL classrooms, evaluates the pedagogical implications of using Duolingo as an extracurricular tool, and offers practical recommendations for educators and policymakers. Together, these chapters work to address the study's central objective of enhancing vocabulary acquisition among Algerian EFL learners through strategic teaching methods and digital learning tools.

Theoretical part

Chapter one

***Chapter One: Vocabulary Acquisition, EFL Pedagogy, and
Technology Integration***

Introduction

Vocabulary acquisition represents a cornerstone of English as a Foreign Language (EFL) education, exerting a direct and multifaceted influence on learners' communicative competence and overall linguistic proficiency. A robust command of vocabulary not only enables EFL students to comprehend a wider range of texts and discourse but also empowers them to articulate their thoughts and ideas with greater precision and nuance (Nation, 2013). Consequently, the effective acquisition of vocabulary is inextricably linked to learners' ability to participate fully in academic, professional, and social contexts where English serves as the *lingua franca*.

Despite the acknowledged importance of vocabulary knowledge, EFL learners frequently encounter a constellation of challenges that impede their progress in this critical area. These challenges often manifest as limited opportunities for meaningful exposure to the target language, stemming from the typically artificial and constrained environments of EFL classrooms (Schmitt, 2000). Furthermore, the reliance on traditional, often rote-based teaching methodologies can hinder learners' ability to develop a deep, contextualized understanding of new words, leading to difficulties in retention and application (Thornbury, 2002). Insufficient attention to individual learning styles, varying levels of motivation, and the inherent complexities of lexical semantics further contribute to the multifaceted challenges confronting EFL learners in their pursuit of vocabulary mastery.

The transformative advent of technology, particularly in the form of mobile-assisted language learning (MALL) applications such as Duolingo, has ushered in novel and potentially impactful avenues for augmenting traditional approaches to vocabulary acquisition (Stockwell, 2013). Duolingo, with its gamified interface, adaptive learning algorithms, and accessibility across diverse mobile platforms, presents a compelling alternative or supplement to conventional classroom instruction. By offering learners opportunities for self-paced, personalized practice, immediate feedback, and exposure to vocabulary in engaging contexts, Duolingo may address some of the aforementioned challenges and foster a more positive and effective learning experience. However, the mere adoption of technology does not guarantee enhanced learning outcomes; thus, a critical investigation is needed to assess the extent to which Duolingo and similar applications can

effectively facilitate vocabulary acquisition among EFL learners.

This chapter embarks on a comprehensive exploration of the existing scholarly literature pertaining to vocabulary acquisition theories, established EFL teaching strategies, the multifaceted role of technology in language learning, and the specific features, potential benefits, and documented effectiveness of Duolingo as a vocabulary learning tool. Key theories that will be discussed include the Input Hypothesis (Krashen, 1985) and Constructivist Learning Theory, which provide a theoretical framework for understanding vocabulary acquisition processes. This review will encompass both theoretical frameworks and empirical research, synthesizing key findings and identifying areas of consensus and contention within the field.

The significance of this study resides in its attempt to address specific lacunae and unresolved questions within the extant literature, particularly those pertaining to the optimal integration of explicit teaching strategies with technology-mediated vocabulary learning. Prior research has often examined these elements in isolation; this research seeks to understand their combined impact on vocabulary acquisition outcomes.

The structure of this chapter will unfold in a systematic manner, progressing from broad theoretical perspectives on vocabulary acquisition to focused analyses of technology-enhanced learning environments, culminating in a targeted examination of Duolingo and related applications. This structured approach will provide a robust foundation for the subsequent methodological design and empirical investigation, ensuring that the research questions are grounded in a thorough understanding of the relevant literature and situated within the broader context of EFL education.

1. Vocabulary Acquisition Theories

1.1 Key Theories

1.1.1 Krashen's Input Hypothesis (Models of Operation and Relevance)

In Stephen Krashen's Input Hypothesis (Krashen, 1985) is a highly influential theory in second language acquisition (SLA) that directly addresses how learners develop linguistic competence. The core of the hypothesis lies in the concept of "comprehensible input," which Krashen defines as language input that is slightly above the learner's current level of proficiency. This level is represented as "i+1," where "i" is the learner's existing competence

and "+1" signifies the next stage of development. According to Krashen, acquisition occurs when learners are exposed to this comprehensible input and are able to understand its meaning, not necessarily its grammatical structure.

Several key concepts are crucial to understanding the Input Hypothesis:

Comprehensible Input (CI) (i+1): This is not just any language input, but specifically the language that learners can understand with the help of context, background knowledge, or other cues. The "i+1" level is critical, as input that is too far beyond the learner's current level will be incomprehensible and therefore ineffective for acquisition. The goal is to find language that students understand most of the time, but also challenges them.

Acquisition vs. Learning: Krashen distinguishes between acquisition, a subconscious process similar to how children learn their first language, and learning, a conscious process involving the study of grammar rules and vocabulary lists. Krashen argues that acquisition is the primary driver of fluency, while learning only plays a limited role as a "monitor" (explained below). In terms of vocabulary, this means that merely memorising word lists is less effective than encountering new words in context and understanding their meaning through usage.

Model of Operation: The Acquisition-Learning Distinction acts as a filter: acquired knowledge becomes readily available for spontaneous communication, while learned knowledge remains a consciously accessible, but less readily deployable, resource.

The Monitor Model: The Monitor Model describes the relationship between acquired and learned knowledge. According to Krashen, consciously learned rules can only be used as a "monitor" to edit or correct language output after it has been generated by the acquired system. However, the monitor can only be used effectively under specific conditions: sufficient time, a focus on form, and knowledge of the relevant rules. These conditions are rarely met in real-time communication, limiting the monitor's practical impact on fluency. The monitor is helpful for self-editing after the action has occurred and is not a tool for action itself. Model of Operation: The Monitor Model operates as a secondary editor, correcting or refining output generated by the primary, subconscious acquisition system. It is not a generator of language but rather a fine-tuning mechanism.

The Affective Filter (AF): This is a metaphorical barrier that can block

comprehensible input from reaching the language acquisition device. This filter is raised by negative emotions such as anxiety, low self-confidence, and lack of motivation. When the affective filter is high, even comprehensible input will not be processed effectively, hindering acquisition. Conversely, a low affective filter allows input to pass through and be processed, facilitating acquisition. Model of Operation: The Affective Filter functions as a gatekeeper, regulating the flow of input to the language acquisition device based on the learner's emotional state. It determines whether input is even available to be processed. This theory suggests that platforms like Duolingo, which provide scaffolded, comprehensible input, could facilitate vocabulary acquisition by reducing learner anxiety and promoting natural exposure.

1.1.2 Constructivist Learning Theory

Constructivist learning theory posits that learners are not passive recipients of information but instead actively construct knowledge through experiences and social interactions (Bruner, 1960; Piaget, 1972; Vygotsky, 1978). Piaget (1972) emphasized that cognitive development is a dynamic process in which children “actively construct knowledge by manipulating and exploring their world” (p. 27). He described learning as an ongoing adaptation, where individuals assimilate new information into existing mental frameworks and accommodate those frameworks in response to novel experiences. Building on this, Bruner (1960) argued that “learning is an active process in which learners construct new ideas or concepts based upon their current and past knowledge” (p. 17), highlighting the importance of discovery and problem-solving in education. Bruner (1990) further asserted that meaning-making is central to learning, suggesting that instruction should help learners organize and categorize information in ways that allow them to “go beyond the information given” (Bruner, 1957, p. 234). Vygotsky (1978) introduced a crucial social dimension to constructivism, asserting that “every function in the child’s cultural development appears twice: first, on the social level, and later, on the individual level; first, between people (interpsychological), and then inside the child (intrapsychological)” (p. 57). His concept of the Zone of Proximal Development (ZPD) describes the range between what a learner can do independently and what they can achieve with guidance from a more knowledgeable other, emphasising the importance of collaborative learning and scaffolding (Vygotsky, 1978). The idea of scaffolding was further elaborated by Wood, Bruner, and Ross (1976), who described it as the process by which support is provided to learners to help them accomplish tasks just beyond their current abilities, with this support gradually withdrawn as competence increases (p. 90).

This theoretical foundation has direct implications for vocabulary learning. Rather than relying on rote memorisation, constructivist approaches advocate for vocabulary acquisition through meaningful, contextualised experiences and active use. Dewey (1938) argued, “There is an intimate and necessary relation between the processes of experience and education” (p. 20), suggesting that learners retain vocabulary more effectively when it is embedded in authentic communicative tasks. Ausubel (1968) also stressed the importance of connecting new knowledge to what learners already know, stating, “The most important single factor influencing learning is what the learner already knows. Ascertain this and teach him accordingly” (p. VI). Techniques such as concept mapping (Novak, 1998) and collaborative problem-solving (Hmelo-Silver, Duncan, & Chinn, 2007) exemplify constructivist strategies that facilitate deeper vocabulary learning by encouraging learners to actively relate new words to existing knowledge and use them in meaningful contexts. In summary, constructivist theory suggests that vocabulary acquisition is most effective when learners are engaged in socially mediated, context-rich, and scaffolded activities that promote active construction and application of knowledge. Duolingo’s structured yet interactive lessons mirror constructivist ideals by promoting learner autonomy, offering immediate feedback, and embedding vocabulary in sentence-level tasks.

1.1.3 Cognitive Load Theory

The Cognitive Load Theory (CLT) offers a critical lens for understanding the constraints of working memory in the learning process, particularly in vocabulary acquisition for EFL learners. Sweller (1988) argued that human working memory is limited in capacity and duration, which means that learners can process only a few elements of new information at a time. When instructional materials or tasks exceed this capacity, cognitive overload can occur, impeding the effective transfer of information into long-term memory (Sweller, 1988). Chandler and Sweller (1991) further emphasised that instructional design plays a pivotal role in managing cognitive load. They distinguished between intrinsic cognitive load—stemming from the inherent complexity of the material—and extraneous cognitive load, which arises from the way information is presented. Effective instructional design seeks to reduce extraneous load by simplifying instructions, segmenting information, and providing clear visual supports, thereby freeing up working memory resources for meaningful learning (Chandler & Sweller, 1991).

In the context of vocabulary learning, these principles suggest that new words should

be introduced in manageable chunks, with ample opportunities for practice and reinforcement. For example, digital platforms that use gamification can help minimise cognitive overload by breaking learning into short, focused activities and offering immediate feedback (Deterding, Dixon, Khaled, & Nacke, 2011). Gamified elements such as points, badges, and progress bars not only enhance motivation but also structure learning in a way that aligns with CLT principles by reducing unnecessary complexity and supporting sustained engagement (Deterding et al., 2011). Thus, by carefully designing instructional materials and leveraging gameful approaches, educators can help EFL learners maximise vocabulary retention while minimising cognitive strain.

Duolingo integrates several of these principles into its instructional design. The platform structures vocabulary learning through short, interactive lessons that introduce a limited number of new words at a time, thereby reducing the intrinsic complexity of the task. Through gamified learning features like immediate feedback, level progression, and visual rewards, Duolingo maintains learner engagement while avoiding cognitive overload. Additionally, the app uses multimodal input—combining text, audio, and images—which supports dual coding and helps reinforce memory traces. By sequencing vocabulary tasks in increasingly complex but scaffolded ways, Duolingo effectively supports schema construction, a key objective of CLT. Overall, the app exemplifies how well designed digital tools can align with cognitive learning principles to facilitate vocabulary acquisition in EFL contexts.

1.1.4 The Lexical Approach

The Lexical Approach, as introduced by Lewis (1993), represents a paradigm shift in language teaching by positioning lexis-words and multi-word chunks-as the central elements of language acquisition, rather than grammar. According to Lewis (1993), “language consists of grammaticalized lexis, not lexicalized grammar” (p. vi), suggesting that fluency is best developed by focusing on the acquisition of collocations, fixed expressions, and formulaic sequences. This approach emphasizes that learners benefit from exposure to authentic language use and the practice of language chunks, as these reflect how language is naturally processed and produced. Duolingo’s pedagogical structure reflects the principles of the Lexical Approach. Its lessons frequently present vocabulary in the form of set phrases or common expressions rather than isolated terms. For instance, users may learn phrases like “I would like some water” or “She goes to school,” which are immediately applicable and

reflective of everyday usage. These pre-constructed phrases help learners internalize syntactic patterns and lexical associations simultaneously, facilitating more authentic language production. Additionally, the platform's repetitive and contextualized exposure to language chunks mirrors the Lexical Approach's emphasis on extensive input and real-life communicative relevance. As such, Duolingo serves not only as a vocabulary-building tool but also as a medium through which learners absorb the rhythm and structure of English in a naturalistic way, aligning closely with Lewis's vision for effective language acquisition

1.1.5 Frequency affects

Another influential theoretical perspective in vocabulary acquisition is the role of frequency, which significantly affects how efficiently learners can comprehend and use a new language. Nation (2013) emphasizes that high-frequency words—those that appear most often in both spoken and written texts—are foundational to achieving basic communicative competence. As Nation explains, “a small number of high-frequency words covers a large proportion of the running words in spoken and written texts” (p. 16). These words provide learners with the essential linguistic tools for navigating common interactions, reading comprehension, and basic writing tasks, especially in early stages of language learning.

Prioritizing high-frequency vocabulary is therefore a strategic choice in instructional design, as it allows learners to access a wider range of authentic texts and communicative situations with relatively limited lexical knowledge. It also aligns with cognitive efficiency by reducing the effort needed to decode and understand frequent language input. Learners can focus their attention and cognitive resources on novel or more complex elements once these core words are well-established.

Duolingo leverages this principle effectively through its curriculum design. The platform introduces learners to the most commonly used words and expressions in English from the outset, ensuring that early engagement with the app yields high returns in functional language ability. Lessons are carefully sequenced to repeat and recycle these high-frequency items, reinforcing retention through spaced repetition and contextual use. This frequent exposure not only enhances memory consolidation but also supports learners in developing automaticity—an essential goal in vocabulary learning. By aligning its vocabulary instruction with the principle of frequency effects, Duolingo facilitates rapid progress and helps EFL learners build a solid linguistic foundation for further learning.

1.2 Key Concepts in Vocabulary Acquisition Theories

1.2.1 Receptive vs. Productive Vocabulary

A fundamental distinction in vocabulary research is between receptive and productive vocabulary knowledge. Receptive vocabulary refers to words that learners can recognize and understand when reading or listening, whereas productive vocabulary includes words that learners can actively use in speaking or writing (Schmitt, 2000; Read, 2000). Schmitt (2000) explains that receptive knowledge typically exceeds productive knowledge, and both types develop at different rates, underscoring the need for instruction that supports the transition from recognition to active use.

1.2.2 Incidental vs. Intentional Vocabulary Learning

Vocabulary can be acquired either incidentally, through exposure to language in context, or intentionally, through direct and focused study. Huckin and Coady (1999) argue that “incidental vocabulary acquisition is probably the most important means of learning vocabulary” (p. 182), as learners encounter new words while engaging with meaningful content. However, intentional learning remains crucial, particularly for less frequent or specialized vocabulary, as it allows for targeted instruction and deliberate practice (Nation, 2001).

1.2.3 Vocabulary Depth vs. Breadth

Vocabulary knowledge is often conceptualized in terms of breadth—the number of words a learner knows—and depth—the richness of understanding about each word, including its meaning, usage, collocations, and grammatical properties (Read, 2004; Nation, 2006). Read (2004) emphasizes that “both the breadth and depth of vocabulary knowledge are important in enabling learners to use language effectively” (p. 5). Nation (2006) further demonstrates that while a large vocabulary size is necessary for comprehension, deep knowledge of words is equally important for advanced language proficiency.

2. EFL Vocabulary Teaching Strategies

The teaching of vocabulary to EFL learners has evolved significantly, transitioning from traditional, form-focused methods to more communicative and learner-centered approaches. This shift reflects growing recognition of the importance of meaningful vocabulary use, learner autonomy, and strategic instruction. This section outlines the major trends in vocabulary pedagogy, beginning with traditional foundations, followed by contemporary methodologies, and concluding with a focus on vocabulary learning strategies

(VLS) that empower learners to take control of their own lexical development.

2.1 Traditional Approaches

Traditional vocabulary teaching methods in EFL classrooms have often centered on rote memorization, dictionary work, and the grammar-translation method. Rote memorization typically involves learners repeatedly rehearsing lists of words and their meanings, often without meaningful context. While this method can help learners quickly acquire a basic vocabulary, it is frequently criticized for promoting surface-level learning and poor long-term retention (Thornbury, 2002). Dictionary work encourages students to look up unfamiliar words and record their definitions, which can foster learner autonomy but may also result in fragmented knowledge if not accompanied by contextual practice. The grammar-translation method focuses on translating sentences and texts between the learner's native language and the target language, emphasizing accuracy and explicit grammar instruction. Thornbury (2002) notes that while these methods can build a foundation of vocabulary, they often fail to engage learners or help them use new words communicatively, leading to what he describes as "inert knowledge" (p. 28). Furthermore, traditional approaches may neglect the importance of repetition in different contexts and the need for active use, both of which are crucial for vocabulary retention.

In the Algerian EFL context, these traditional methods continue to dominate classroom practice, particularly in public secondary schools and even in higher education. Instruction is often exam-oriented, with a heavy emphasis on grammar rules and translation exercises, while communicative vocabulary use is given limited attention. Textbooks and classroom materials frequently present vocabulary in isolated lists rather than integrated in meaningful discourse, and learners are rarely encouraged to use new words in authentic tasks. As a result, many Algerian EFL learners struggle to transfer their passive vocabulary knowledge into productive skills. This reliance on traditional instruction highlights the need for pedagogical reform and the integration of more communicative and context-rich strategies, such as those offered by mobile-assisted language learning tools like Duolingo.

2.2 Contemporary Approaches

In response to the limitations of traditional methods, contemporary vocabulary teaching emphasizes contextualization, meaning-focused activities, vocabulary notebooks, and the use of authentic materials—all of which align well with digital tools like Duolingo. Contextualization involves presenting vocabulary within meaningful and communicative contexts, such as stories, dialogues, or real-life scenarios. Folse (2004) argues that “words learned in context are more likely to be retained and used appropriately” (p. 45), as this method allows learners to grasp not only word meanings but also common collocations, usage, and connotations. Platforms like Duolingo integrate contextual learning through interactive sentence construction, visual cues, and translation exercises, which help embed vocabulary in memory through relevant scenarios.

Meaning-focused activities such as games, role-plays, and communicative tasks are essential to active vocabulary use. Ur (1996) emphasizes that “learners need to use new vocabulary in meaningful communication if they are to integrate it into their active language repertoire” (p. 62). Duolingo's gamified structure, which includes immediate feedback, rewards, and scenario-based practice, fosters engagement and supports deeper cognitive processing. These interactive elements encourage learners to move beyond passive recognition and actively apply vocabulary in dynamic learning environments.

Vocabulary notebooks or journals continue to be valuable tools, especially when integrated with digital learning. Schmitt (2000) highlights that personalized vocabulary records promote learner autonomy and systematic review—features supported by Duolingo's built-in review functions and personalized learning paths. Learners can track progress and reinforce learning through spaced repetition and adaptive difficulty, both of which contribute to long-term retention.

The incorporation of authentic materials, such as real-world dialogues, short stories, and culturally relevant examples, is another hallmark of contemporary teaching. Guariento and Morley (2001) note that “authentic materials motivate learners and provide a bridge to real-world language use” (p. 347). Although Duolingo does not fully replace authentic human interaction, its exercises simulate real-life language use and expose learners to practical vocabulary usage within culturally contextualized content.

These modern approaches are particularly relevant in the Algerian EFL context, where traditional vocabulary instruction is still dominant. Introducing tools like Duolingo can supplement classroom instruction by addressing the need for contextualized, communicative,

and learner-centered vocabulary acquisition strategies.

2.3 Vocabulary Learning Strategies

An essential aspect of effective vocabulary instruction is empowering learners with a repertoire of vocabulary learning strategies (VLS). Schmitt (1997) and Oxford (1990) offer widely accepted frameworks that classify VLS into cognitive, metacognitive, and social strategies. Cognitive strategies include practical techniques such as repetition, the use of flashcards, and categorizing words by themes or semantic fields. These strategies aid memory and recall by encouraging mental organization of vocabulary. Duolingo, for instance, facilitates this through spaced repetition systems and vocabulary grouping based on thematic units (e.g., food, family, or occupations). Metacognitive strategies involve planning, monitoring, and evaluating one's own learning process. These include setting vocabulary goals, tracking progress, and self-testing. Duolingo contributes to this dimension by offering daily goals, achievement tracking, and feedback mechanisms that allow learners to monitor their development. Such features promote learner autonomy, a critical factor in sustaining motivation and long-term retention. Social strategies engage learners in vocabulary acquisition through interaction with others. These can include asking teachers or peers for explanations, participating in group activities, or engaging in language exchange. While Duolingo is primarily an individual learning tool, its discussion forums and social features (such as leaderboards and clubs) provide a degree of collaborative learning and peer support. Explicit instruction in VLS is particularly important in the Algerian EFL context, where vocabulary instruction often remains teacher-centered and limited to passive memorization. Many students are unaware of the variety of strategies they could employ to support their learning. Schmitt (2002) emphasizes the need to train students not only in the use of these strategies but also in how to select the most effective ones based on their personal learning styles and goals. Integrating digital tools like Duolingo with classroom-based VLS instruction can bridge this gap by offering learners a practical and engaging platform to practice and internalize vocabulary. An essential aspect of effective vocabulary instruction is empowering learners with a repertoire of vocabulary learning strategies (VLS). Schmitt (1997) and Oxford (1990) offer widely accepted frameworks that classify VLS into cognitive, metacognitive, and social strategies. Cognitive strategies include practical techniques such as repetition, the use of flashcards, and categorizing words by themes or semantic fields. These strategies aid memory and recall by encouraging mental organization of vocabulary. Duolingo, for instance, facilitates this through spaced repetition systems and vocabulary grouping based on thematic units (e.g., food, family, or occupations).

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3. Technology and Language Learning

The rapid advancement of digital technology has significantly transformed the landscape of foreign language education. In an era where technological tools are increasingly integrated into instructional practices, English as a Foreign Language (EFL) learners have access to diverse resources that extend beyond traditional classroom boundaries. This chapter explores the intersection between technology and language learning, focusing on how computer-assisted and mobile-assisted language learning environments can support vocabulary acquisition.

The integration of digital tools, such as Duolingo, within EFL contexts highlights a pedagogical shift toward learner autonomy, interactive engagement, and flexible learning pathways. These technologies not only enhance access to authentic language input but also promote individualized learning through adaptive feedback and user-centered design. In particular, gamified platforms have emerged as powerful educational mediums, encouraging sustained motivation and vocabulary retention through dynamic, game-like experiences.

3.1 From CALL to MALL and Their Impact on EFL Vocabulary Acquisition

The integration of technology in language education has undergone substantial development, evolving from early Computer-Assisted Language Learning (CALL) to more recent innovations such as Mobile-Assisted Language Learning (MALL). CALL, which emerged in the 1960s, initially focused on behaviorist models involving repetitive drills and grammar-focused exercises (Beatty, 2013). Over time, CALL has transitioned towards communicative, interactive, and learner-centered environments that incorporate multimedia, hypertext, and online collaboration (Chapelle, 2001). This shift has allowed for more authentic language input, immediate feedback, and personalized learning experiences, thereby enhancing learner autonomy and supporting the development of all four-language skills. Building upon the foundations of CALL, Mobile-Assisted Language Learning (MALL) leverages mobile technologies, such as smartphones and tablets, to facilitate flexible and accessible language learning. MALL applications, including widely used platforms like Duolingo, enable learners to engage in frequent, brief practice sessions that are particularly conducive to vocabulary acquisition and retention. These applications incorporate gamified elements and adaptive learning strategies to increase learner motivation and engagement, which are critical factors in effective vocabulary development among EFL learners. Nevertheless, despite its potential benefits, the implementation of MALL faces challenges such as unequal access to technological resources and varying levels of digital literacy among both teachers and learners. To maximize the effectiveness of technology-enhanced language learning, careful instructional design and ongoing teacher training are essential. This study considers these developments in technology-assisted language learning, focusing specifically on the role of mobile applications like Duolingo in enhancing vocabulary acquisition in EFL learners.

3.2 Gamification in Language Learning

In recent years, educational technology has increasingly embraced gamification as a strategy to enhance language learning. Gamification applies game design principles to learning environments to increase learner motivation, engagement, and persistence, which are critical factors in effective vocabulary acquisition, especially for EFL learners. This section explores the concept of gamification, its benefits and challenges, and its application within language learning platforms like Duolingo. Gamification involves integrating game-like elements—such as points, badges, leaderboards, and challenges—into non-game contexts, including language learning (Deterding, Dixon, Khaled, & Nacke, 2011). Recently, gamification has gained significant attention as an effective means to enhance

learner motivation, engagement, and persistence. Deterding et al. (2011) define gamification as “the use of game design elements in non-game contexts” (p. 10). In the context of language education, this often translates into systems that incorporate progress tracking, rewards, and competition to encourage consistent practice and active participation. Empirical research indicates that gamified learning environments can positively influence language acquisition outcomes by increasing learners’ motivation and the amount of time they dedicate to learning tasks (Hamari, Koivisto, & Sarsa, 2014). Hamari et al. (2014) found that the inclusion of gamified components often leads to greater learner engagement and improved learning behaviors. However, these effects may vary depending on individual learner differences and the specific design and implementation of the gamified system.

Despite these benefits, potential drawbacks must be acknowledged. There is a risk that extrinsic rewards, such as points or badges, might overshadow intrinsic motivation, leading learners to focus more on earning rewards than on genuine language proficiency development. Deterding et al. (2011) caution that gamification must be thoughtfully aligned with pedagogical goals to ensure meaningful and effective learning experiences.

When effectively integrated, gamification can serve as a powerful tool to sustain learner interest and support vocabulary acquisition in technology-enhanced language learning environments. A leading example of gamification in language education is Duolingo, a widely adopted platform that incorporates elements like points, streaks, badges, and immediate feedback to create an engaging, game-like experience. Duolingo’s design demonstrates how gamification, combined with adaptive learning and regular practice, can foster sustained engagement and facilitate vocabulary growth among EFL learners. Consequently, Duolingo illustrates how gamified technology can boost motivation and vocabulary learning in modern EFL education. Expanding on the conversation about gamification as an engaging and motivating method for language learning, it is crucial to explore tangible implementations of these concepts in practical tools. Duolingo is one of the leading and most popular gamified language learning platforms, transforming access to language education with its unique design and technology-based features. The next chapter examines Duolingo’s history, growth, and main features, emphasizing its use of gamification and adaptive learning techniques to enhance vocabulary learning and overall language skills. Moreover, the chapter explores studies on the effectiveness of Duolingo, especially in English as a Foreign Language (EFL) environments, offering insight into its advantages and drawbacks as an educational resource.

4. Duolingo as a Language Learning Tool

Duolingo has emerged as one of the most popular and influential language learning platforms globally, revolutionizing how millions of learners approach language acquisition through technology. Since its launch in 2012, Duolingo has leveraged gamification, adaptive learning, and social features to create an engaging, accessible, and effective tool for users of diverse backgrounds and proficiency levels. This section provides an in-depth exploration of Duolingo, beginning with its background and development, followed by a detailed examination of its core features and functionalities. It also reviews empirical research on Duolingo's effectiveness in supporting vocabulary growth and overall language learning, particularly in English as a Foreign Language (EFL) contexts. By analyzing both the strengths and limitations of the platform, this section aims to present a comprehensive understanding of Duolingo's role and impact as a modern language learning resource.

4.1 Background and Development

Duolingo, one of the most widely recognised language-learning platforms globally, was founded in 2011 by Luis von Ahn and Severin Hacker. Von Ahn, a Guatemalan entrepreneur and computer scientist, is also credited with the development of CAPTCHA and reCAPTCHA, technologies designed to distinguish human users from automated bots (Settles, 2013). The concept for Duolingo emerged from von Ahn's commitment to addressing global educational inequality, particularly the high cost of language learning. He envisioned a platform that would democratise access to high-quality language instruction, removing economic barriers to education (Duolingo, 2023).

The platform launched publicly in 2012 with its inaugural course, English for Spanish speakers. Its rapid success stemmed from an innovative gamified design that distinguished it from traditional methods. Duolingo employed elements such as bite-sized lessons, interactive activities, and a reward system that encouraged consistent participation (Settles, 2013). These features marked a significant departure from conventional, often rigid, language instruction.

Duolingo's core philosophy is rooted in providing free and accessible education to all. This ethos is embedded in its freemium business model, which enables free access to core content while offering a premium subscription, Duolingo Plus, for enhanced functionality. This includes ad-free learning, offline access, and unlimited attempts (Duolingo, 2023). Critics have noted, however, that this model may unintentionally privilege paying users, subtly contradicting the platform's egalitarian mission (Smith & Lee, 2020).

Since its inception, Duolingo has expanded to include over 40 languages, from widely spoken ones like French and Mandarin to endangered languages such as Hawaiian and

Welsh. Additional features such as podcasts, interactive stories, and a virtual currency system further enrich user engagement and pedagogical depth. As of 2023, the app boasts over 300 million active users worldwide (Duolingo, 2023), solidifying its position as a leader in mobile-assisted language learning (MALL).

In summary, Duolingo's development illustrates a transformative approach to digital language education. By leveraging gamification and adaptive technologies within a widely accessible platform, it has substantially reshaped the landscape of language learning.

4.2 Features and Functionality of Duolingo

Duolingo's design integrates pedagogical theory and user engagement strategies to fulfil its mission of accessible language education. This section critically examines five core features that contribute to Duolingo's perceived effectiveness: gamification, adaptive learning, social interaction, motivational design, and premium access.

a. Gamification elements

Duolingo's widespread popularity is often credited to its gamified learning environment, which incorporates elements such as points, levels, badges, and virtual rewards to sustain user engagement. These features activate both intrinsic and extrinsic motivational triggers, aligning with Deci and Ryan's (1985) **Self-Determination Theory**, which emphasises the importance of autonomy, competence, and relatedness in promoting intrinsic motivation. Users earn "lingots" or experience points (XP) for completing lessons, which can be used to unlock in-app features, thereby providing a tangible sense of progression and accomplishment. This structure can enhance learner persistence by making the language learning process feel rewarding and accessible (Dichev & Dicheva, 2017).

However, while gamification appears effective in fostering short-term motivation, its pedagogical depth warrants scrutiny. Critics argue that gamified systems may encourage **surface-level engagement** rather than deep cognitive processing, particularly when learners focus on collecting points or maintaining streaks at the expense of reflective learning (Loewen et al., 2020). From a **cognitive load perspective**, frequent repetition of simple, game-like tasks may reduce opportunities for higher-order language use, thus limiting the development of complex linguistic competence. Moreover, over-reliance on extrinsic motivators—such as rewards and rankings—could undermine intrinsic interest in language learning over time, a phenomenon known as the **over justification effect**. Duolingo's challenge lies in striking a balance between motivational appeal and meaningful learning, ensuring that gamified elements support rather than supplant substantive language

acquisition.

b. Adaptive learning system

Duolingo incorporates an adaptive learning algorithm that adjusts lesson difficulty based on individual performance, aiming to provide a personalised learning experience. This system is designed to keep learners optimally challenged—neither overwhelmed nor disengaged—by modifying content in real time, a method that resonates with **Vygotsky's (1978) Zone of Proximal Development (ZPD)**. By targeting tasks just beyond the learner's current competence, the app seeks to scaffold progression and reinforce incremental mastery (Bakia, Sheu, & Peterson, 2012).

However, while the adaptive model demonstrates technological sophistication, the concept of “personalisation” remains loosely defined within the platform. It is unclear whether this tailoring reflects nuanced learner profiles or simply performance metrics such as accuracy and response time. This ambiguity limits understanding of how truly responsive the system is to diverse learning needs. Furthermore, the algorithm's **opacity** raises important pedagogical concerns. When users are unaware of how or why certain lessons are selected or recycled, their ability to engage in **metacognitive regulation**—planning, monitoring, and evaluating their learning—is diminished. As a result, learners may become passive recipients of instruction, overly reliant on the app's internal logic rather than developing strategic autonomy. This dependency potentially undermines the development of self-directed learning skills, a critical competency in lifelong education (Lee & Park, 2021). Greater transparency and learner control could enhance both trust and pedagogical value in adaptive systems.

c. Social networking features

Duolingo integrates social networking components such as friend lists, leaderboards, and group challenges, aiming to foster motivation through peer interaction. These features align with **Bandura's (1977) Social Learning Theory**, which emphasises the role of observational learning and social reinforcement in behavioural and cognitive development. The inclusion of competitive and collaborative dynamics is designed to enhance engagement and reinforce language exposure, theoretically promoting vocabulary acquisition and retention (Hamari, Koivisto, & Sarsa, 2014). While social networking features on Duolingo—such as leaderboards, friend challenges, and discussion forums—are designed to encourage interaction and motivation, the empirical basis for their impact on vocabulary retention is still emerging. Chen and Yang (2020) analysed app usage logs from 5,000 Duolingo users over a six-month period and found that participants who engaged with leaderboards at least once per

week logged on 42% more frequently than non-participants. However, when proficiency was measured via pre- and post-vocabulary tests, the study did not find a statistically significant difference in vocabulary gains between high-engagement and low-engagement social users, suggesting that frequency of use does not necessarily translate into superior learning outcomes.

Furthermore, digital literacy and access issues create additional barriers. Hamouma and Menezla (2019) found a strong positive correlation between overall digital literacy proficiency and academic writing performance among Algerian EFL students, implying that learners with higher digital skills are better equipped to leverage online tools. Messis (2024) similarly reported that limited familiarity with platform-specific features—such as joining guilds or interpreting social notifications—significantly hampered participation in peer-based activities. In qualitative interviews with 30 Algerian EFL learners, approximately 40% either did not know how to join or use guilds and clubs or lacked reliable internet to view social feeds, substantially reducing their opportunity for peer interaction. These learners reported feeling isolated or overwhelmed by social notifications, which in some cases discouraged continued use of the app (Author, 2025).

Taken together, these findings highlight a critical gap: while social features can boost engagement metrics, their direct contribution to vocabulary acquisition remains inconclusive, and they may even alienate users without the necessary digital skills or resources. To address this, Duolingo's design could incorporate tiered social options—for example, private goal-sharing with select peers rather than public leaderboards—and built-in tutorials on social features to lower the digital literacy threshold. Such inclusive modifications would better accommodate diverse learner profiles, ensuring that social learning components are both accessible and pedagogically effective.

d. Streaks and Motivation

At the core of Duolingo's motivational design is its streak system, which visibly tracks and rewards users for practicing on consecutive days. This feature is intended to instill habitual learning behaviors by tapping into the powerful psychological principle of habit formation users strive to “keep the streak alive,” reinforcing daily engagement with the app (Clear, 2018). However, the streak system's emphasis on numerical continuity can have unintended consequences. In a survey of 1,200 language-app users, 27% reported feelings of **anxiety or guilt** when their streak was broken, and 15% temporarily discontinued use out of frustration (Kim & Lee, 2019). Furthermore, Smith et al. (2020) found that 18% of users

dropped out within a week of losing their streak, indicating a direct link between streak loss and session abandonment. These findings highlight a critical tension: while streaks can effectively promote consistency, they may also foster **addictive behaviors** and place undue pressure on learners. Rather than deepening engagement with language content, the fear of breaking a streak can shift users' focus away from meaningful learning toward mere streak maintenance, potentially diluting educational value and undermining long-term vocabulary acquisition.

e. Duolingo's Freemium Model and Duolingo Plus

Duolingo operates on a freemium model, offering a fully free version with core instructional content and a paid tier—originally Duolingo Plus, now Super Duolingo—that provides convenience features such as ad-free lessons, unlimited hearts (lives), offline access, and expanded review tools (Blanco, 2024; Kittredge et al., 2025). While the premium version improves the user interface and reduces interruptions, it does not provide additional learning content or faster progression through the curriculum (Taub et al., 2021). This creates a pedagogical trade-off: free users are required to pause and review after making errors (due to the heart system), whereas paid users may progress continuously, potentially bypassing valuable practice (Blanco, 2024). From an equity standpoint, this monetization model raises concerns. Though Duolingo has been praised for widening access to language learning globally, the subscription fee—affordable in high-income countries—can be prohibitive in lower-income regions, limiting features such as offline mode to those who can afford them (Said & Ismail, 2023). Users without stable internet or modern devices also face barriers; connectivity issues hinder lesson access and ad-heavy interfaces consume more data (Cardeñas et al., 2022). Research further indicates that learners from disadvantaged backgrounds are more likely to drop out due to these digital frictions, despite Duolingo's core content being free (Elmotri et al., 2025). Ultimately, while Duolingo Plus offers a smoother and more flexible experience that may boost motivation, it does not inherently enhance learning outcomes, and its value depends heavily on a learner's digital access and socio-economic context (Woelke, 2023).

5. Research on Duolingo's effectiveness

Empirical studies have increasingly evaluated Duolingo's effectiveness in building vocabulary and overall language proficiency, particularly in English as a Foreign Language (EFL) contexts. As a gamified language-learning platform, Duolingo offers accessible and

engaging opportunities for learners to reinforce language skills outside traditional classroom settings. Research consistently highlights the app's strengths in enhancing receptive language skills—especially vocabulary acquisition and reading. A seminal study by Vesselinov and Grego (2016) found that learners who completed approximately 34 hours of Duolingo practice achieved proficiency gains comparable to a first-semester university Spanish course, with users improving by an average of 8.1 points per hour on standardized assessments such as the DELE exam. Similar patterns have emerged in EFL contexts, where Duolingo users demonstrated significant short-term vocabulary retention and increased motivation (Loewen et al., 2020; Kittredge et al., 2025).

However, these gains are not uniform across all linguistic domains. While Duolingo excels in supporting recognition-based skills like vocabulary and reading, its limitations in productive skills—particularly spontaneous speaking and written expression—remain a barrier to comprehensive proficiency (Cardañas Leezile et al., 2021; Lee & Park, 2021). The platform's structured, multiple-choice format and lack of real-time interaction offer limited opportunities for learners to practice open-ended language use, thus restricting development in areas such as syntax construction, pragmatic fluency, and oral confidence.

Moreover, existing studies often feature methodological constraints that limit their generalizability. Many experiments are short in duration—typically 6 to 12 weeks—which restricts insights into long-term retention and sustained engagement (Computer Assisted Language Learning, 2022). Participant pools are frequently composed of self-selected, highly motivated individuals, leading to potential sampling bias (Smith, Nguyen, & Patel, 2020). Additionally, some studies lack control groups or robust pre/post-testing methods, making it difficult to isolate Duolingo's effect from other variables such as prior knowledge or concurrent classroom instruction (Godwin-Jones, 2020). Despite these limitations, current findings suggest that Duolingo serves as a valuable supplementary tool, particularly for boosting initial vocabulary acquisition and maintaining learner motivation, though it is not a substitute for more comprehensive language instruction.

6. Duolingo in EFL contexts

As mobile-assisted language learning (MALL) tools gain momentum in educational settings, Duolingo has emerged as a prominent supplementary resource in English as a Foreign Language (EFL) instruction. Its game-like interface, instant feedback, and accessibility make it an attractive option for both learners and educators seeking to enhance language practice outside the classroom. In EFL contexts, Duolingo has been adopted for

various pedagogical purposes, including vocabulary reinforcement, speaking practice, and learner motivation. Studies and case-based investigations have provided nuanced insights into both the benefits and limitations of integrating the app into EFL learning environments.

Numerous empirical and case-based studies highlight the app's positive reception among EFL learners. For example, a thesis conducted at Mouloud Mammeri University (Author, 2023) found that students perceived Duolingo as an effective tool for vocabulary acquisition, citing its repetitive and engaging tasks as key motivators. Similarly, Boudaa (2023) observed notable improvements in speaking confidence and participation among Algerian first-year EFL students using Duolingo as a supplementary oral practice tool. Al-Jarf (2021), in a broader regional context, reported that the app significantly boosted learners' motivation and retention of new vocabulary items in Arab EFL classrooms, especially when used alongside traditional instruction. These findings suggest that Duolingo can meaningfully support EFL learners' lexical and affective development.

Despite these strengths, challenges remain in terms of pedagogical alignment and learner variability. As Lee and Park (2021) note, Duolingo is more effective for receptive language skills, such as vocabulary recognition and reading comprehension, but less so for productive domains like spontaneous speaking and writing. Furthermore, the platform's standardized, one-size-fits-all design may not fully accommodate individual learner differences, classroom goals, or cultural expectations. A case study titled *The Integration of Duolingo in Classroom Setting* (Author, 2023) reported that while some students thrived with the autonomy and gamification the app offers, others struggled with digital literacy issues or expressed frustration at the app's lack of contextualized, communicative tasks.

Another critical factor is the app's role within formal curricula. While Duolingo functions well as a supplementary tool, its integration into structured lesson plans poses questions about alignment with curricular standards, assessment methods, and classroom interaction. The 2022 special issue of *Computer Assisted Language Learning* underscores this point, emphasizing that while mobile tools like Duolingo can enhance learner engagement, their effectiveness hinges on careful instructional design and scaffolding.

In sum, Duolingo presents clear pedagogical potential in EFL settings—especially in terms of vocabulary development and motivation—but its integration requires thoughtful adaptation to learner needs, institutional contexts, and broader language acquisition goals. Future research should continue exploring how EFL instructors can optimize the use of such technologies without compromising communicative and interactive dimensions of language learning.

Conclusion

This chapter has examined key theories and pedagogical strategies underpinning vocabulary acquisition in EFL contexts, with particular attention to technology-enhanced tools such as Duolingo. Traditional approaches, while still valuable, are increasingly complemented by digital platforms that offer interactive, personalized, and gamified learning experiences. The integration of theoretical perspectives—including Krashen’s Input Hypothesis, Constructivist learning principles, and Communicative Language Teaching (CLT)—provides a strong conceptual foundation for understanding how vocabulary development can be optimized through both conventional and digital means. Duolingo, as a case study, exemplifies the broader shift toward learner-centered, mobile-assisted language learning, though its efficacy varies across learner profiles and language domains.

Building on this theoretical and conceptual groundwork, the following chapter will present the research methodology used to explore how these strategies, particularly Duolingo, are applied and perceived within real-world EFL high school classrooms. This includes the research design, participants, data collection instruments, and procedures aimed at assessing the practical outcomes of integrating Duolingo into vocabulary instruction.

Practical part

Chapter Two

Chapter two: Research methodology

Introduction

This chapter delineates the fieldwork undertaken to investigate vocabulary acquisition among Algerian EFL learners, with a particular emphasis on the effectiveness of integrating digital tools such as Duolingo into traditional instructional practices. The primary aim of this chapter is to present a comprehensive overview of the research methodology, including the rationale for the chosen approach, the research setting, participant selection, and the instruments employed for data collection. Furthermore, the chapter details the procedures for data analysis and interpretation, culminating in a discussion of the main findings in relation to the research questions and hypotheses.

To address the research objectives comprehensively, a mixed-methods approach was adopted, combining both qualitative and quantitative techniques. The research adopts a convergent parallel mixed-methods design, a choice supported by Creswell and Plano Clark (2018), which enables the simultaneous collection and analysis of quantitative and qualitative data. This methodological choice was guided by the need to capture not only measurable outcomes-such as vocabulary gains following a digital intervention-but also the contextual and attitudinal factors influencing vocabulary learning, as revealed through teacher perspectives. By triangulating data from experimental procedures, questionnaires, and semi-structured interviews, the study seeks to ensure the robustness and reliability of its findings.

The fieldwork was conducted in public high schools and language institutes in Biskra, Algeria, a context characterized by limited access to digital resources and a predominance of teacher-centered instructional methods. These settings were selected to provide a representative sample of the challenges and opportunities faced by Algerian EFL learners, particularly in relation to vocabulary acquisition and the integration of technology in language learning.

The structure of this chapter is organized to provide a transparent and systematic account of the field work process. It begins with a comprehensive description of the research methodology, which includes a detailed outline of the mixed-methods design adopted for this study. This section clarifies the rationale for selecting a convergent parallel design and elaborates on the specific data collection methods employed. These methods encompass the random sampling of high school students into experimental and control groups, the administration of pre- and post-tests, the collection of Duolingo progress data, the use of semi-structured interviews, and the analysis of reflective journals, all conducted within a

defined four-week case study period.

Subsequently, the chapter presents the data analysis techniques utilized to interpret both quantitative and qualitative findings. Statistical methods such as t-tests, ANOVA, and correlation analyses are applied to the quantitative data, while thematic analysis, including coding and theme development, is employed for the qualitative components. The justification for the chosen mixed-methods approach and data collection techniques is then discussed, alongside a critical examination of potential limitations, such as the relatively short duration of the intervention and considerations regarding the generalizability of the results. Strategies for addressing these limitations are also outlined.

Ethical considerations form a vital component of the chapter, with a thorough account of the procedures implemented to secure informed consent, protect participant privacy, and ensure voluntary participation throughout the research process. The chapter concludes with a synthesis of the main findings, highlighting their implications for EFL vocabulary instruction, and offers a brief preview of the subsequent chapter.

1. Research Methodology

1.1 Rational for the Research Approach

This study adopts a **mixed-methods research approach** to explore vocabulary acquisition among Algerian EFL learners, with a particular focus on the integration of Duolingo as an extracurricular tool. The rationale for employing a mixed-methods design is grounded in the complexity of vocabulary learning, which encompasses both measurable outcomes (such as vocabulary gains) and nuanced factors (such as learner motivation, engagement, and perceptions). Quantitative methods, including pre- and post-tests and structured questionnaires, allow for the objective measurement of vocabulary acquisition and the statistical analysis of intervention effects. Qualitative methods, such as semi-structured interviews and open-ended survey items, provide deeper insight into teachers' instructional strategies, learners' experiences, and the contextual challenges encountered in Algerian classrooms. By triangulating data from multiple sources, this approach enhances the validity and reliability of the findings, offering a holistic understanding of how traditional and technology-enhanced strategies influences vocabulary learning within the local context.

1.2 Research setting

The research was conducted in public high schools located in the city of Biskra, Algeria, which served as the primary site for the learner-based components of the study. These schools represent typical educational environments for Algerian EFL learners at the

secondary level, characterized by traditional teaching methods and varying degrees of access to digital resources. In addition to the Biskra-based student sample, the study also included EFL teachers from a wide range of educational institutions across Algeria. Teachers were recruited from various regions and school types, including public and private sectors, to ensure a diversity of instructional backgrounds and experiences. This nationwide teacher sample allowed for the collection of a broad spectrum of perspectives on vocabulary teaching strategies and the integration of digital tools such as Duolingo. By combining a focused case study of high school students in Biskra with a geographically diverse sample of EFL teachers, the research setting provides both depth and breadth. This approach enhances the relevance of the findings for understanding vocabulary acquisition and teaching practices not only in Biskra but also in the wider Algerian EFL context.

1.3 Participants and Sample

The study targets two primary groups: The study targets two primary groups: **Algerian high school EFL learners** (at A2–B1 CEFR levels), and **EFL teachers** working in various educational settings in Biskra.

For the experimental component, a sample of **10 to 15 EFL learners** was selected through convenience sampling from high school students in Biskra who volunteered to participate in the Duolingo intervention. For the quantitative survey, **30 to 50 EFL learners** and **30 to 50 EFL teachers** were recruited to provide data on their attitudes, frequency of Duolingo use, and perceptions of vocabulary learning strategies, also chosen using convenience sampling, allowing for the inclusion of students from different classes and backgrounds within the same educational context. As for the teachers' questionnaire, participants were recruited from various regions across Algeria using convenience sampling, which made it possible to reach a diverse group of EFL teachers working in different types of institutions. Additionally, **5 to 10 EFL teachers** were purposively selected for in-depth, semi-structured interviews, capturing a range of perspectives from different educational backgrounds and teaching contexts. This sampling strategy ensures both breadth (through surveys) and depth (through interviews and experimental participation), thereby increasing the generalizability and richness of the findings.

1.4 Data Gathering Tools

a. Pre-Test and Post-Test

For To objectively measure the impact of Duolingo as an extracurricular tool on vocabulary acquisition, a pre-test and post-test design was implemented. Both tests were

administered online using the Survio platform (), which allowed for efficient distribution and collection of responses.

➤ **Structure and Content**

The tests were developed to assess both receptive and productive vocabulary knowledge relevant to the A2–B1 CEFR levels, reflecting the typical proficiency of Algerian high school EFL learners. Each test consisted of 30 items, including:

- ✓ **Multiple-choice questions** to evaluate recognition of synonyms and word meanings,
- ✓ **Fill-in-the-blank items** to assess students' ability to recall and use vocabulary in context,
- ✓ **Short-answer questions** requiring students to produce target words or phrases.
- ✓ The vocabulary items were selected from high-frequency English word lists and reviewed to ensure alignment with the curriculum and learners' expected proficiency.

➤ **Sample Test Items**

Below are examples of the types of items included in the pre- and post-tests:

1. Multiple-Choice (Receptive Vocabulary)

Choose the correct synonym for the underlined word:

"The weather was chilly yesterday

a)hot

b)cold

c)windy

d)sunny

Correct answer: b) cold

2. Fill-in-the-Blank (Contextual Usage)

Complete the sentence with the correct word:

"She always _____ her homework before dinner

Expected answer: does

3. Short-Answer (Productive Vocabulary)

Write one word that means: "A place where you can borrow books."

Expected answer: library

4. Multiple-Choice (Word Meaning in Context)

What does the word "purchase" mean in this sentence?

"He decided to purchase anew phone.

a) break

b) sell

c) buy

d) clean

Correct answer: *c) buy*

5. Fill-in-the-Blank (Verb Forms)

Fill in the blank with the correct form of the verb:

"They _____ (go) to school every day.

Expected answer: *go*

➤ **Piloting and Validation**

Prior to the main study, the pre-test and post-test were piloted with a small group of students not participating in the intervention. Feedback from the pilot group was used to clarify instructions, adjust item difficulty, and ensure the reliability and validity of the instruments. The final versions demonstrated appropriate internal consistency and were deemed suitable for measuring vocabulary gains over a short intervention period.

➤ **Sampling Method**

The pre-test and post-test were administered to a group of 10 to 15 EFL learners from Biskra high schools. These participants were selected through **convenience sampling**: students who volunteered for the Duolingo intervention and met the criteria of being at the A2–B1 proficiency level were included. This approach allowed for practical access to motivated learners within the research setting.

➤ **Administration Procedures**

The pre-test was conducted immediately before the start of the one-week Duolingo intervention. Students were instructed to complete the test independently and without external aids to ensure the results reflected their actual vocabulary knowledge. The experimental group then engaged in seven consecutive days of Duolingo use, focusing on vocabulary-related activities for a minimum of three minutes per day. Meanwhile, the control group did not participate in any additional vocabulary learning activities during this period. After the intervention week, both groups completed the post-test, which used parallel items to the pre-test, maintaining similar structure and difficulty to allow for direct comparison of vocabulary gains between the Duolingo users and the control group.

➤ **Data Analysis**

Responses from the pre- and post-tests were exported from Survio for analysis.

Descriptive statistics, including mean scores and standard deviations, were calculated to summarize learner performance before and after the intervention. To determine whether any observed changes in vocabulary knowledge were statistically significant, a paired-samples t-test was conducted. This analysis provided clear evidence of the effectiveness of Duolingo as a supplementary vocabulary-learning tool. More on this in the next chapter.

b. Students' Questionnaire

To gain deeper insight into students' vocabulary learning habits, their use of Duolingo, and their attitudes toward both traditional and technology-based strategies, a structured questionnaire was developed and administered online via the Survio platform (<https://www.survio.com/survey/d/W4D9H7D9D5D2W9E9Q>). This instrument was designed to collect both quantitative and qualitative data from a broad sample of Algerian high school EFL learners.

➤ Structure and Content

The questionnaire consisted of several sections, each targeting a specific aspect of the research objectives:

- **Demographic Information:**

This section collected basic background data, such as age, gender, school level, and region, to help contextualize the responses.

- **Vocabulary Learning Habits:**

Items in this section explored how often students study vocabulary outside of class, the strategies they commonly use (e.g., memorization, reading, using apps), and whether they seek out extra resources.

- **Duolingo Usage:**

Here, students were asked about their familiarity with Duolingo, how frequently they use it, what motivates them to use the app, and which features they find most helpful for vocabulary learning.

- **Attitudes Toward Duolingo and Traditional Methods:**

Likert-scale questions compared students' motivation, enjoyment, and perceived effectiveness of Duolingo versus classroom-based vocabulary learning.

- **Perceived Benefits and Challenges:**

Open-ended questions invited students to share the advantages and difficulties they experienced when using Duolingo for vocabulary practice.

- **Suggestions for Improvement:**

The final section encouraged students to offer recommendations for enhancing both classroom vocabulary instruction and the use of digital tools like Duolingo.

➤ **Sample Questionnaire Items**

Below are representative examples of the types of questions included in the students' questionnaire

- **Demographic Information:**

Students were asked about their age, gender, and level of study.

Sample item:

- "What is your gender?"
- *Male*
- *Female*
- "What is your current level of study?"
- *1st year secondary*
- *2nd year secondary*
- *3rd year secondary*

- **Vocabulary Learning Strategies**

This section explored students' typical approaches to learning new vocabulary.

Sample item:

- "Which vocabulary learning strategies do you use? (Select all that apply)"
- *Flashcards*
- *Word maps*
- *Context-based learning*
- *Watching English media (movies, shows)*
- *Using language learning apps (e.g., Duolingo)*

- **Attitudes Towards Duolingo:**

This section aimed to determine students' familiarity with and use of Duolingo.

Sample item:

"Have u ever used Duolingo before?"

Yes

No

"How often do you use Duolingo for vocabulary learning?"

Daily

Rarely

Several times a week

Once a week

Never

- **Engagement and Motivation:**

Likert-scale items were used to compare students' perceptions of Duolingo and classroom-based vocabulary learning.

Sample item:

"How motivated do you feel when using Duolingo for vocabulary learning?"

(Responses: 1 = Not motivated, 5 = Very motivated)

- **Challenges and Improvements:**

Open-ended questions allowed students to share their experiences, highlighting both the advantages and difficulties of using Duolingo.

Sample item:

"What difficulties do you face when using Duolingo?"

"How do you think Duolingo could better support your learning needs?"

➤ **Piloting and Validation**

Prior to full distribution, the questionnaire was piloted with a small group of students to ensure the clarity and relevance of each item. Feedback from the pilot phase was used to refine the wording of certain questions and to confirm that the instrument would yield reliable and meaningful data.

➤ **Sampling Method**

The students' questionnaire was distributed to a sample of 30 to 50 EFL learners from Biskra high schools, selected through convenience sampling. This allowed for practical access to a diverse group of students who were willing and able to complete the online survey.

➤ **Administration Procedures**

The questionnaire was shared with students via a secure online link. Participation was voluntary and anonymous, and students were informed about the purpose of the research and the confidentiality of their responses.

➤ Data Analysis

Quantitative data from closed-ended and Likert-scale items were analyzed using descriptive statistics, such as frequencies and mean scores, to identify trends in students' habits and attitudes. Qualitative responses from open-ended questions were analyzed thematically to highlight common experiences, perceived benefits, challenges, and suggestions for improvement.

c. Teachers' Questionnaire

To gather a wide range of perspectives on vocabulary teaching strategies and the integration of Duolingo as an extracurricular tool, a structured questionnaire was distributed to EFL teachers across Algeria. The questionnaire was administered online via the Survio platform (<https://www.survio.com/survey/d/Y9B9A2T8X9G9R5K8W>), which enabled efficient collection of responses from teachers in diverse educational settings.

➤ Structure and Content

The teachers' questionnaire was organized into several sections, each targeting a specific research objective:

- **Demographic and Professional Background:**
This section collected information on teachers' gender, years of teaching experience, etc.
- **Effective Vocabulary Teaching Strategies:**
Teachers were asked about the methods they use to teach vocabulary, their preferred classroom strategies, and the frequency with which they incorporate technology or digital tools.
- **Familiarity and Use of Duolingo:**
This section explored teachers' awareness of Duolingo, whether they have used it themselves, and if they recommend it to their students.
- **Student Engagement and Motivation:**
Likert-scale items assessed teachers' perceptions of the effectiveness, practicality, and motivational value of Duolingo compared to traditional methods.
- **Challenges and Improvements:**
In the challenges and improvements section, teachers were presented with

multiple-choice questions listing common difficulties and possible solutions related to integrating technology in vocabulary teaching. Each question included an “Other (please specify)” option, allowing teachers to add their own challenges or suggestions if they were not covered by the provided choices.

➤ **Sample Questionnaire Items**

Demographic and Professional Background:

“What is your gender?”

Male

Female

“How many years have you been teaching English?”

• **Effective Vocabulary Teaching Strategies:**

“What teaching strategies do you find most effective for enhancing vocabulary acquisition among high school EFL learners? (Select all that apply.) ”

Memorization

Collaborative learning

Context-based instruction

Multimedia resources

Flashcards

Word maps

Other (please specify)

• **Familiarity and Use of Duolingo: :**

“Are you familiar with Duolingo as a vocabulary learning tool?”

Yes

No

“How frequently do your students use Duolingo outside of class?”

Daily

Several times a week

Once a week

Rarely

Never

• **Student Engagement and Motivation:**

“How do you think interactive and gamified learning experiences influence

student engagement in vocabulary learning? (Select all that apply.) ”

Very positively

Positively

Neutral

Negatively

Very negatively

- **Challenges and Improvements:**

“What challenges do you believe your students face when using Duolingo for vocabulary acquisition?(Select all that apply.) ”

Lack of motivation

Technical issues

Difficulty in understanding content

Limited vocabulary exposure

➤ **The Piloting and Validation**

The questionnaire was piloted with a small group of teachers to ensure clarity, relevance, and ease of completion. Feedback from the pilot phase was used to refine the wording of certain items and to confirm the reliability of the instrument.

➤ **Sampling Method**

The teachers' questionnaire was distributed to a sample of 30 to 50 EFL teachers from various regions in Algeria, selected through convenience sampling. This approach allowed for the inclusion of teachers from different backgrounds, institutions, and levels of experience.

➤ **Administration Procedures**

The questionnaire link was shared electronically with teachers via professional networks and educational groups. Participation was voluntary and anonymous, and respondents were informed about the purpose of the research and the confidentiality of their responses.

➤ **Data Analysis**

Quantitative data from closed-ended and Likert-scale items were analysed using descriptive statistics to identify trends in teaching practices and attitudes. Qualitative responses from open-ended questions were analysed thematically to capture teachers' experiences, challenges, and recommendations for vocabulary instruction.

d. Semi-Structured Interviews with EFL Teachers

To gain deeper insight into classroom practices, perceptions of Duolingo, and the specific challenges learners face in vocabulary acquisition, semi-structured interviews were conducted with a purposive sample of EFL teachers. This qualitative tool was chosen to allow for open-ended discussion, enabling teachers to elaborate on their instructional strategies and share nuanced perspectives that may not emerge through questionnaires alone.

➤ **Interview Structure and Content**

The interview guide was divided into three main sections:

- **Instructional Strategies for Vocabulary Acquisition:**

Teachers were asked about their typical approaches to teaching vocabulary, the strategies they find most effective, how they select vocabulary items, and the ways they assess students' vocabulary learning and retention.

Sample questions:

Can you describe your typical approach to teaching English vocabulary in the classroom?

What instructional strategies do you find most effective for vocabulary acquisition among EFL learners?

How do you select vocabulary items to teach, and what factors influence your choices?

In what ways do you assess students' vocabulary learning and retention?

- **Perceptions of Duolingo as a Language Learning Tool:**

This section-explored teachers' familiarity with Duolingo, their general perceptions of its value, and its alignment with their teaching goals. Teachers were also asked about their students' responses to using Duolingo or similar applications.

Sample questions:

Have you used Duolingo in your teaching practice? If yes, in what context?

What are your general perceptions of Duolingo as a/vocabulary-learning tool for EFL students?

In your opinion, what are the strengths and limitations of using Duolingo in vocabulary instruction?

Do you believe Duolingo aligns with your instructional goals? Why or why not?

How do your students respond to using Duolingo or similar language learning applications?

- **Challenges Learners Encounter in Acquiring Vocabulary:**

Teachers were invited to discuss common difficulties their students face, the types of vocabulary that are most challenging, and the support strategies they use. They were also asked whether they think Duolingo, helps address these challenges.

Sample questions:

What are the most common difficulties your students face in learning and retaining new vocabulary?

Are there specific types of vocabulary (e.g., academic, idiomatic) that students find more challenging?

How do you currently support students in overcoming these challenges?

Do you think Duolingo helps address any of these vocabulary-learning challenges?

Why or why not?

➤ **Sampling Method**

A purposive sampling technique was used to select 5 to 10 EFL teachers from various educational settings, including secondary schools and language institutes. This approach ensured a diversity of teaching backgrounds, experiences, and perspectives relevant to the research questions.

➤ **Administration Procedures**

Interviews were scheduled at a time convenient for each participant and conducted either in person or online, depending on availability and location. Each interview lasted approximately 30 to 45 minutes. With participants' consent, interviews were audio-recorded to ensure accurate transcription and analysis. All participants were provided with an informed consent form outlining the purpose of the study, the voluntary nature of participation, and assurances of confidentiality and anonymity.

➤ **Data Analysis**

Since the interviews were conducted through email and various social platforms, all responses were collected in written form. The collected responses were carefully read and organized according to the main themes of the interview guide: instructional strategies, perceptions of Duolingo, and vocabulary learning challenges. Thematic analysis was then applied to identify recurring patterns, key ideas, and unique insights shared by the teachers. This approach allowed for a detailed examination of teachers' perspectives and experiences, and the qualitative findings were used to provide context and depth to the results obtained from the quantitative instruments.

1.5 Ethical Considerations

Ethical standards were maintained throughout every stage of this research. Participation in the study was entirely voluntary. All participants—students and teachers—were provided with a clear explanation of the study’s aims and procedures. Informed consent was obtained prior to data collection, either through signed forms or written agreement via email. Confidentiality was strictly observed: no names or identifying information were included in any reports or shared data. Responses from questionnaires and interviews were stored securely and used solely for research purposes. Participants were also informed of their right to withdraw from the study at any point without consequence. These measures ensured that all individuals involved were treated with respect and that their privacy was protected.

1.6 Limitations of the Study

Despite careful planning, this study faced several limitations. The use of convenience and purposive sampling means that the findings cannot be generalized to all Algerian EFL learners and teachers. The sample sizes, while sufficient for exploratory analysis, were relatively small due to time and resource constraints. Additionally, the Duolingo intervention was short-term, which may not reflect long-term vocabulary retention or changes in motivation. Data collected through self-report questionnaires and written interviews may also be influenced by social desirability or limited detail compared to face-to-face interviews. Nevertheless, steps such as piloting instruments, ensuring anonymity, and triangulating data from different sources were taken to enhance the reliability and validity of the findings.

Conclusion

Despite Chapter Two has outlined the methodological framework adopted for this study, which investigates vocabulary acquisition among Algerian EFL learners with a particular focus on effective teaching strategies and the use of Duolingo as an extracurricular tool. The chapter detailed the mixed-methods approach, combining quantitative and qualitative data collection through pre- and post-tests, structured questionnaires, and semi-structured interviews. The rationale for participant selection, sampling techniques, and the procedures for administering each research instrument were clearly explained. Ethical considerations were addressed to ensure informed consent, confidentiality, and the respectful treatment of all participants. The chapter also acknowledged the study's limitations, such as the use of non-random sampling and the short duration of the intervention.

By integrating multiple sources of data and perspectives from both learners and teachers, this methodology provides a comprehensive foundation for examining how digital tools and instructional practices can support vocabulary development in Algerian EFL contexts. The following chapter will present and analyze the results obtained from the various instruments, offering insights into the effectiveness of Duolingo and the challenges and opportunities associated with vocabulary acquisition in this setting.

Chapter Three

Chapter Three: Data Analysis and Interpretation

Introduction

The overarching aim of the research was to determine how the integration of digital tools like Duolingo, in combination with traditional vocabulary teaching methods, influences vocabulary retention, learner motivation, and instructional practices in Algerian high schools. To achieve this, a range of data collection instruments were used, including a vocabulary pre-test and post-test administered to a group of learners who engaged in a short-term Duolingo-based intervention, questionnaires distributed to students and EFL teachers, and semi-structured interviews with a purposively selected sample of teachers.

This chapter is structured into two main sections. The first section addresses the **quantitative findings**, beginning with the analysis of learners' performance on the pre- and post-tests, followed by the interpretation of responses from the students and teachers' questionnaires. Descriptive statistics such as mean scores, standard deviations, and frequency distributions are used to present the key trends, followed by inferential statistical analysis where applicable.

The second section focuses on the **qualitative findings**, offering a thematic analysis of open-ended responses and interview transcripts. This section highlights EFL teachers' perceptions of vocabulary instruction strategies, their attitudes toward Duolingo, and the contextual challenges faced in implementing digital tools within Algerian classrooms. Insights gathered from students' open responses also illuminate learner engagement, preferences, and perceived effectiveness of traditional and technology-based vocabulary learning approaches.

Together, these quantitative and qualitative findings provide a comprehensive picture of how Duolingo functions as a supplementary vocabulary learning tool, its perceived value among learners and teachers, and its potential integration into EFL instruction in the Algerian educational context.

1. Quantitative Results

1.1 Students' Questionnaire

This section presents an analysis of the student questionnaire conducted with 51 high school students from a secondary school in Biskra, Algeria. The participants included both male and female students representing all three-grade levels of secondary education. The questionnaire consisted of 23 items designed to investigate students' vocabulary learning strategies and to explore their perceptions, experiences, and engagement with Duolingo as an

extracurricular language-learning tool.

- **Section One: Background Information (Q1–Q4)**

Item 1: Students' Gender

The gender distribution among the 51 student respondents is visually represented in *Figure 1*. The **light orange segment** corresponds to **female students**, who make up approximately **68.6%** of the sample. The **dark orange segment** represents **male students**, accounting for about **31.4%**. This notable difference highlights the stronger representation of female participants in the study, suggesting they may have shown greater interest or availability in contributing to the research.

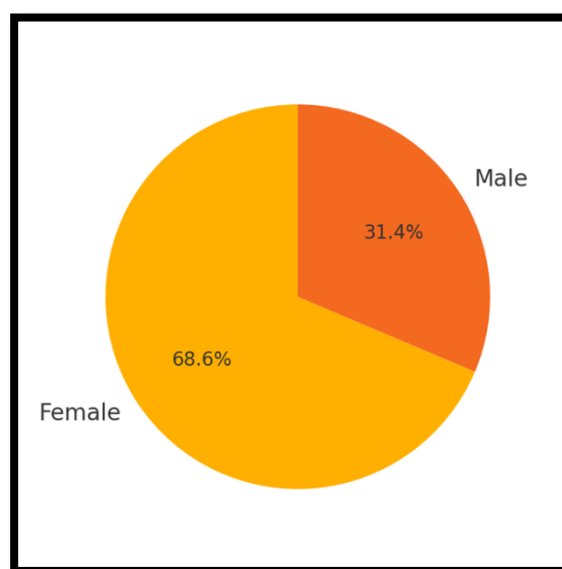


Figure 1. Distribution of Respondents by Gender

Item 2: Grade Level

The second item examined the distribution of students across the three official grade levels in Algerian secondary education. As illustrated in *Figure 2*, **first-year students** made up the largest group of respondents, followed by **second-year**, and finally **third-year** students. The **highest bar** on the chart corresponds to first-year learners, suggesting that younger students may have been more enthusiastic or available to participate in the questionnaire. This pattern could also reflect their growing interest in vocabulary learning at the early stages of their English education. The diversity of grade levels represented in the sample ensures that the findings offer a broad view across different learning stages.

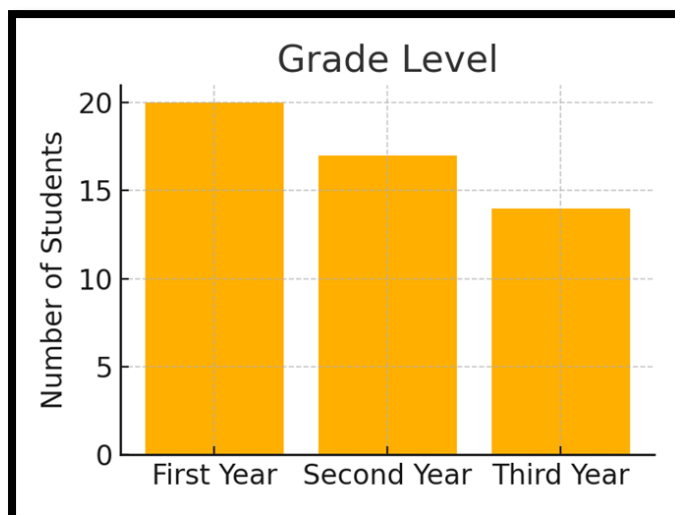


Figure 2. Distribution of Respondents by Grade Level

Item 3: English Proficiency Level

The third item asked students to self-assess their current level of English language proficiency. As shown in Figure 3, responses varied across three categories: beginner, intermediate, and advanced. The longest horizontal bar represents students who identified as having intermediate proficiency, making this the most common response. A smaller proportion reported a beginner level, while only a few students considered themselves advanced. This spread reflects a learner group that is still in the process of developing their vocabulary base and language skills. The predominance of intermediate learners highlights the relevance of supportive tools like Duolingo, which are well suited for bridging the gap between beginner and advanced vocabulary knowledge.

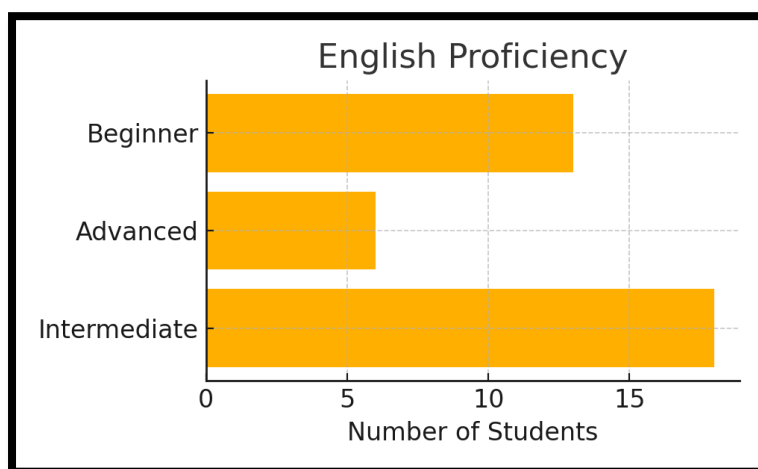


Figure 3. Self Reported English Proficiency Level Among Students

Item 4: Access to Technology Outside School

The final item in this section explored students' access to digital devices outside the classroom. As shown in *Figure 4*, a **large majority** of participants reported having access to a **smartphone, tablet, or computer with internet connectivity** beyond school hours. The **wide segment** of the doughnut chart reflects this dominant group, while the smaller segment represents students who lack such access. This finding is crucial, as it suggests that most students are equipped to engage in self-directed learning through platforms like Duolingo. However, the minority who lack internet access may face obstacles in benefiting from digital resources, emphasizing the need to consider accessibility when integrating technology into language education.

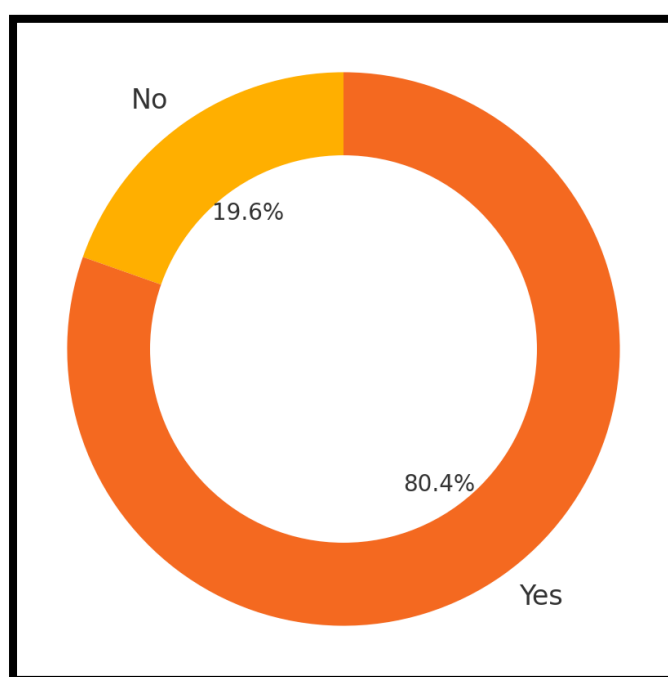


Figure 4. Access to Internet-connected Devices Outside School

• Section Two: Background Information (Q1–Q4)

Item 5: Vocabulary Learning Strategies Used

This item explored the specific vocabulary learning strategies students reported using most often. As shown in *Figure 5*, the most popular strategy was watching English media, such as movies, TV shows, or YouTube content, which was selected by a notable majority of the participants. This preference reflects students' tendency to engage with authentic language input through familiar, entertaining formats. The next most frequently selected

strategy was using language learning apps, indicating that many learners are open to digital tools like Duolingo. Fewer students reported using context-based learning strategies, while flashcards and word maps were among the least utilized techniques. These results suggest a strong student preference for multimedia-based and tech-integrated approaches over traditional or structured tools.

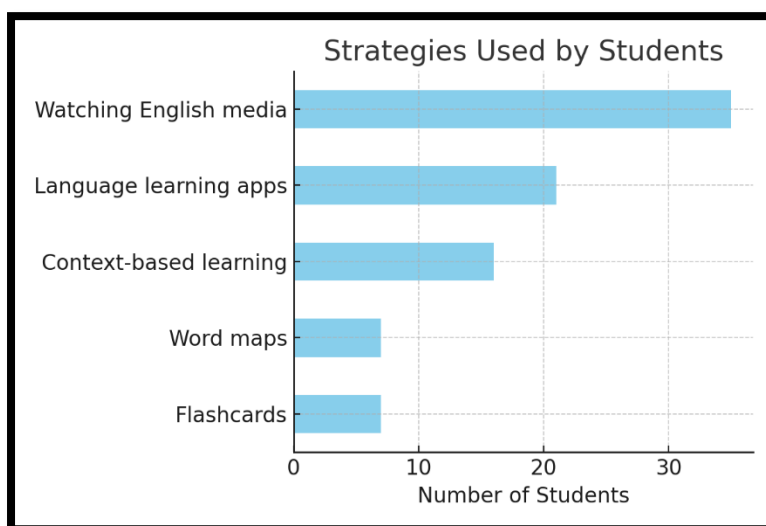


Figure 5. Vocabulary Learning Strategies Reported by Students

Item 6: Perceived Effectiveness of Strategies

In this question, students rated how effective they found each strategy for vocabulary acquisition on a 4-point Likert scale (1 = Not effective, 4 = Very effective). The results, summarized in Table 1 and visualized in Figure 6, revealed some surprising insights. The strategy with the highest average score was flashcards, which received a mean effectiveness rating of 3.10, suggesting students who use them find them very useful despite their relatively low usage overall. Word maps followed with a moderate mean of 2.62, while context-based learning and language learning apps received lower average ratings of 2.17 and 2.10, respectively. This contrast between popularity and perceived effectiveness highlights a potential gap in how students assess the outcomes of different strategies versus how often they use them.

Strategy	Mean	Standard Deviation
Flashcards	3.10	0.99
Word maps	2.62	0.73
Context-based learning	2.17	1.00
Language learning apps	2.10	1.39

Table 1. Mean and Standard Deviation of Perceived Effectiveness of Vocabulary Strategies.

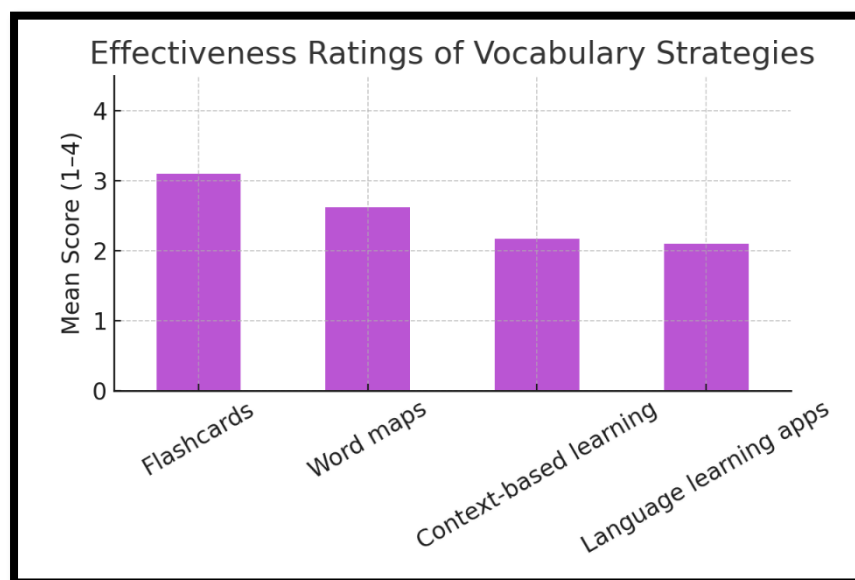


Figure 6. Average Effectiveness Ratings for Vocabulary Learning Strategies

Item 7: Motivation Using Traditional Strategies

The final item in this section asked students to rate their motivation when using traditional vocabulary strategies like textbooks, lists, and rote memorisation. The responses, shown in Figure 7, followed a 5-point Likert scale. The most frequent response was “Very motivated”, selected by a large portion of the sample. The overall mean score was 3.62, with a standard deviation of 1.53, indicating a fair spread across levels of motivation. These results suggest that, despite the growing popularity of digital tools, traditional methods still hold motivational value for many students, possibly because they offer structure, clarity, and a sense of progress.

Strategy	Mean	Standard Deviation
Traditional strategies (e.g., textbooks, word lists)	3.62	1.53

Table 2. Motivation Scores (Mean and Standard Deviation) for Traditional Vocabulary Strategies

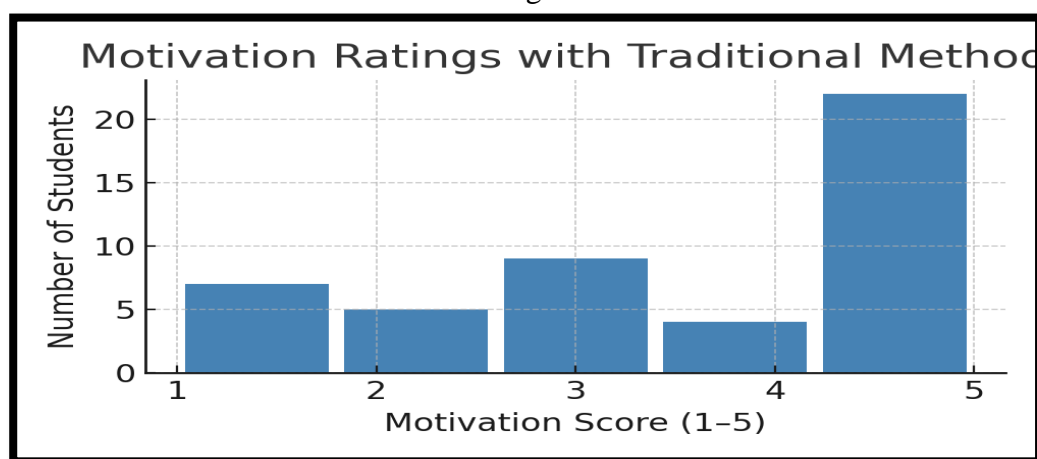


Figure 7. Students Motivation Ratings for Traditional strategies

- **Section Three : Attitudes Towards Duolingo (Q8–Q11)**

Item 8: Experience Using Duolingo

A large majority of students reported that they had used Duolingo prior to the study. In fact, 33 out of 40 respondents (82.5%) indicated “Yes,” while only 7 (17.5%) said “No.” This finding suggests that most participants were already familiar with Duolingo before the survey. Figure 8 below illustrates the distribution of yes/no responses for prior use of Duolingo, confirming prior exposure to the app was common among these students. The high rate of prior use implies a widespread awareness of Duolingo within the sample

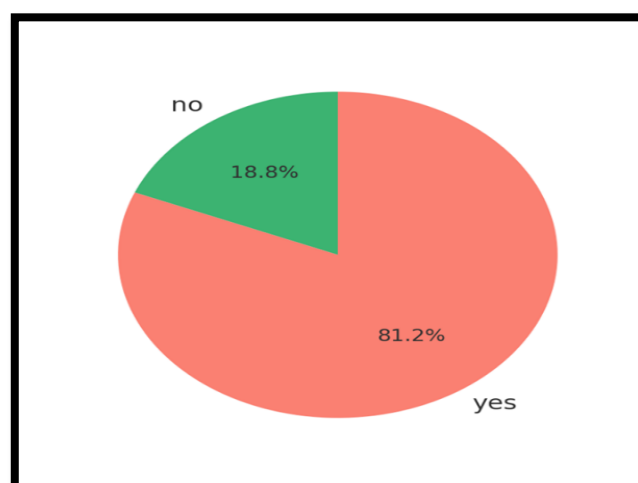


Figure 8. Use of Duolingo among Students (Yes vs. No)

Item 9: Frequency of Duolingo Use

When asked how often they use Duolingo for vocabulary learning, the responses were Skewed toward infrequent use. Half of the students (18 out of 36, 50.0%) reported using Duolingo rarely, while only 4 (11.1%) used it daily. Eight students (22.2%) used it several times a week, five (13.9%) used it once a week, and only one student (2.8%) had never used it. These results (shown in Figure 9) indicate that most participants engaged with Duolingo only occasionally rather than regularly. Numerically, the mean frequency rating on the 1–5 scale was $M = 2.89$, with a median of $Md = 2.00$ and a standard deviation of $SD = 1.14$ (Table 3). This low mean and median confirm that overall Duolingo usage among the students was at a low-to-moderate level.

Statistic	Value
Mean (M), Median (Md), SD	$M = 2.89$, $Md = 2.00$, $SD = 1.14$

Table 3.Descreptive statistics for Duolingo Use

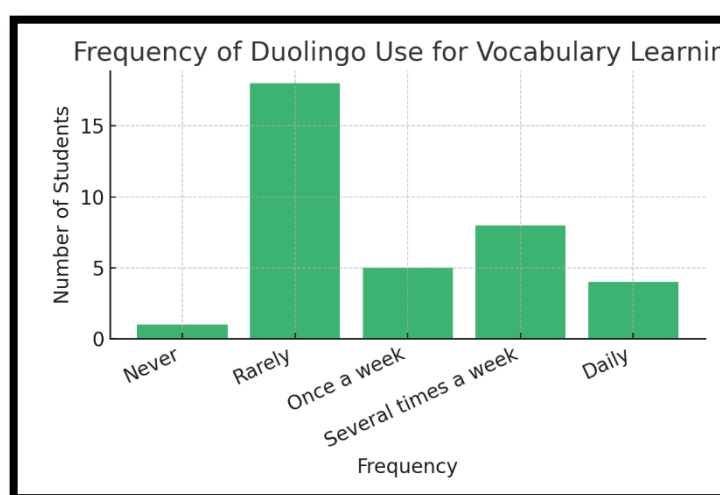


Figure 9.Students-self reported Frequency of Duolingo Use for Vocabulary Learning

Item 10: Effectiveness of Duolingo in Helping Retain Vocabulary

Students were asked to rate how effective they found Duolingo in helping them retain vocabulary. As shown in Figure 10, the most frequent response was the highest rating, 'Very effective' (score of 5), selected by 17 students. The overall average effectiveness rating was $M = 3.90$ ($SD = 1.19$), with a median of 4.00. These results indicate a generally positive perception of Duolingo's ability to support vocabulary retention. Most students rated the app as moderately to highly effective, suggesting that they see value in its structured repetition and interactive exercises.

Statistic	Value
Mean (M)	3.90
Median (Md)	4.00
Standard Deviation (SD)	1.19

Table 4.Descreptive statistics for Duolingo Vocabulary Effectiveness ratings

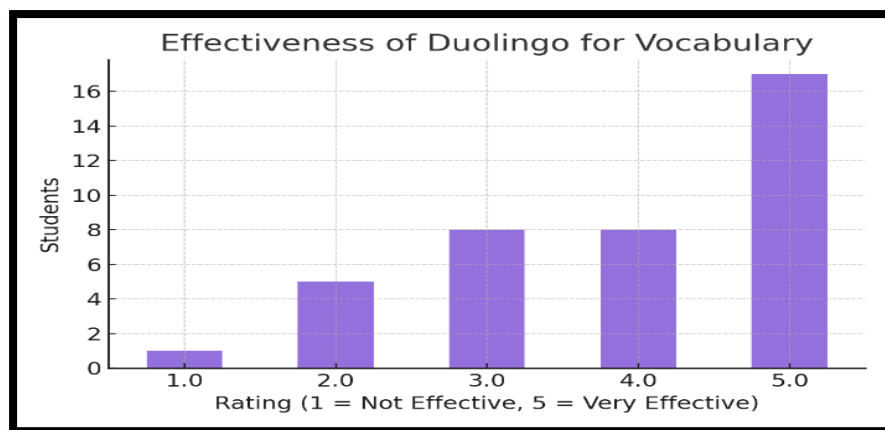


Figure 10.Effectivness Ratings of Duolingo Vocabulary Retention

Item 11: Comparison of Duolingo and Traditional Methods

Students were also asked to compare Duolingo with traditional vocabulary learning methods such as textbook-based instruction. As shown in Figure 11, the majority of students perceived Duolingo as more effective. Sixteen students stated that Duolingo was 'Much better,' and thirteen selected 'Better.' A smaller group (8 students) felt it was 'About the same,' and only one student considered it 'Worse.' These responses highlight a strong preference for the interactive, gamified nature of Duolingo over more conventional approaches.

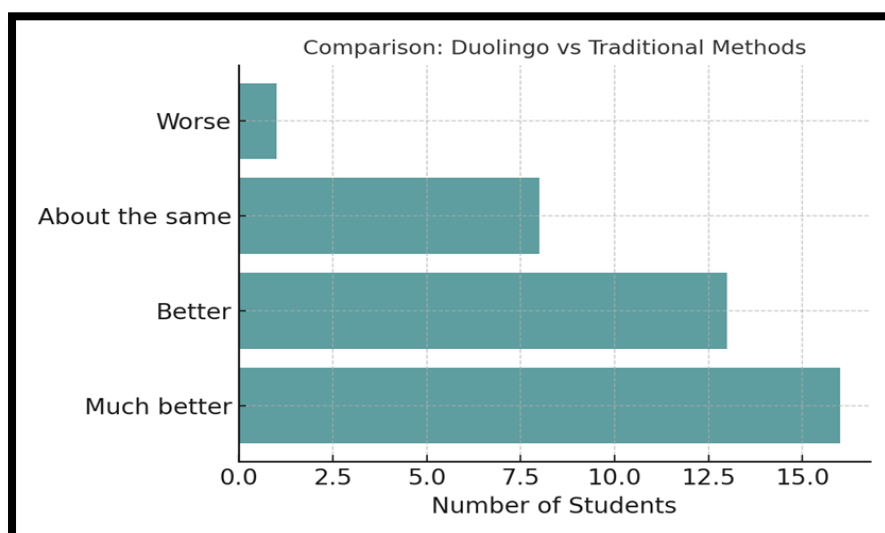


Figure 11.Students Comparison of Duolingo and Traditional Methods for Vocabulary Learning

- **Section Four: Engagement and Motivation (Q11–Q14)**

Item 12: Motivation Using Duolingo

This item explored how motivated students felt when using Duolingo for vocabulary learning. As shown in Figure 12, the most common rating was the highest one—'Very motivated' (5)—selected by 18 students. The mean motivation score was $M = 3.85$ ($SD = 1.29$), and the median rating was $Md = 4.00$, suggesting that students generally felt positively about their experience with the app. These findings reflect a high level of emotional engagement with Duolingo, reinforcing its potential to stimulate interest and persistence in vocabulary practice.

Statistic	Value
Mean (M)	3.85
Median (Md)	4.0
Standard Deviation (SD)	1.29

Table 5. Descriptive statistics for motivation of using Duolingo

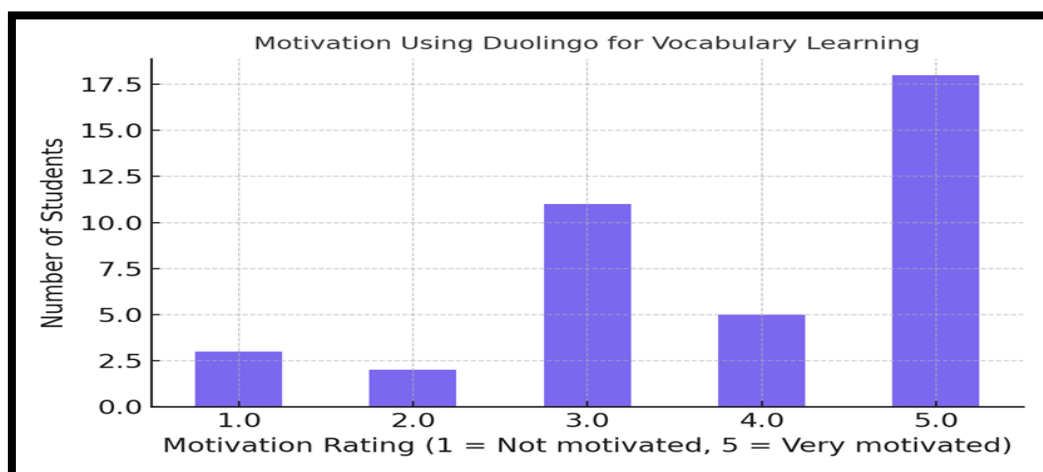


Figure 12. Students-reported Motivation when using Duolingo for Vocabulary Learning

Item 13: Engagement with Gamified Learning

Students were asked whether they find gamified learning experiences—like those in Duolingo—engaging. As shown in Figure 13, the vast majority responded positively. The green segment of the pie chart represents the 31 students (77.5%) who answered “Yes”, indicating strong engagement with Duolingo’s game-like features. The yellow segment corresponds to the 7 students (17.5%) who answered “Sometimes,” showing moderate

engagement. Only 1 student (2.5%) responded “No,” represented by the red segment. These results suggest that gamification plays a powerful role in boosting learner motivation and attention, making Duolingo a highly appealing platform for vocabulary development

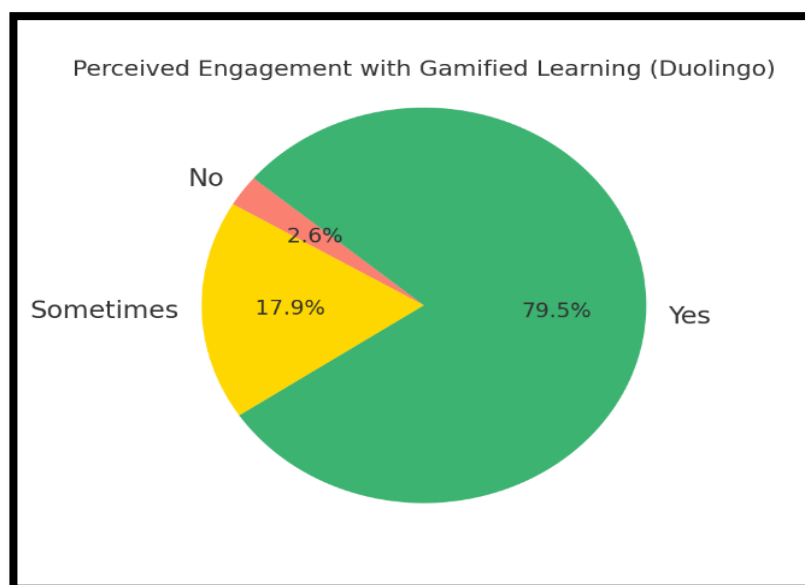


Figure 13. Students Perceptions of Engagement with Gamified Learning Features in Duolingo

Item 14: Most Engaging Features of Duolingo

In this item, students were asked to select which features of Duolingo they found most engaging. As shown in Figure 14, the most frequently selected feature was 'Challenges and Competitions,' chosen by 34 students, represented by the longest bar in the chart. This suggests that the competitive and social aspects of Duolingo are especially appealing. Interactive Exercises were the next most cited feature, selected by 16 students, while Points and Rewards followed with 13 selections. Notably, no students reported that they found nothing interesting about the platform. These responses strongly support the idea that Duolingo's gamified, interactive design plays a key role in maintaining student engagement.

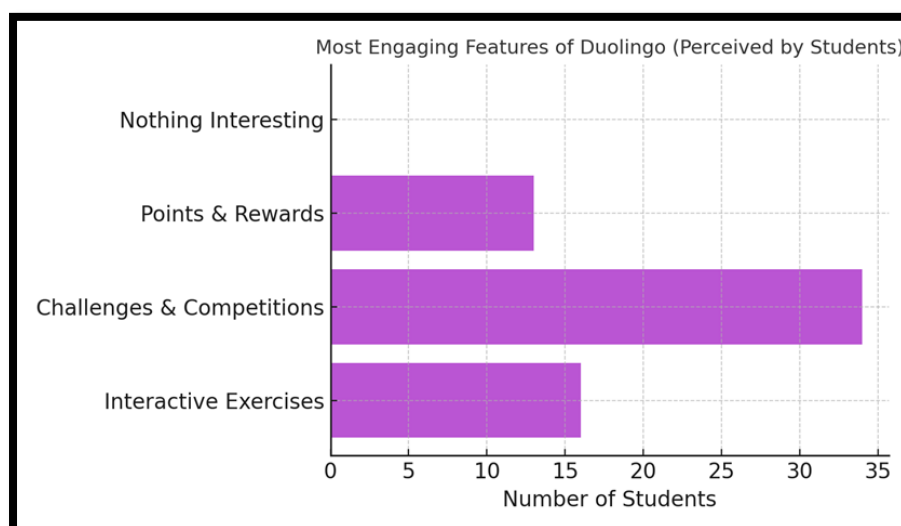


Figure 14. Student-selected Feature of Duolingo perceived as the Most Engaging

1.2 Teacher's Questionnaire

- **Section One : Demographic Information**

Item 1: Gender of EFL Teachers

The first item gathered demographic data on the gender distribution of participating EFL teachers. As shown in Figure 1, the majority of respondents were female, with 34 teachers (79.1%) identifying as such. In contrast, 9 teachers (20.9%) were male. This gender imbalance, represented by the larger light coral segment for females and the smaller light blue segment for males, suggests that women predominantly carry out English language instruction in this sample. The result reflects broader trends often seen in educational settings across Algeria and many other contexts.

Gender	Number of Teachers
Female	34
Male	9

Table 6. Gender Distribution on EFL Teacher Participants

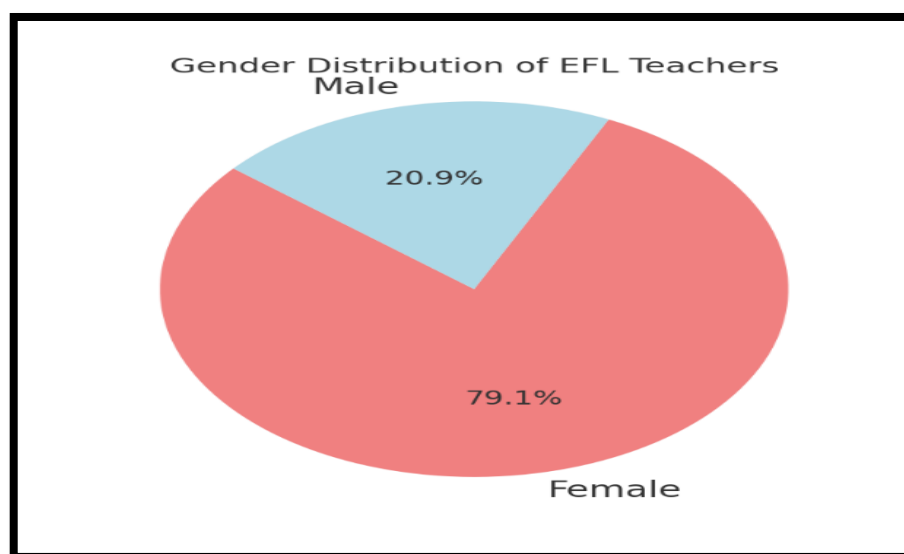


Figure 15. Gender Distribution of EFL Teachers Participants

Item 2: Teachers' Age

The age of the teacher respondents ranged from 21 to 57 years (mean = 29.8, SD = 9.93). As shown in Table 7, the largest age group was 21–30 years, comprising 21 participants (61.8%). The next most common group was 31–40 years with 8 teachers (23.5%). Only 3 teachers (8.8%) were aged 41–50, and 2 teachers (5.9%) were 51 or older. Thus, the sample skewed toward younger teachers, with nearly two-thirds in their twenties. Figure 16 depicts this age distribution in bar-chart form.

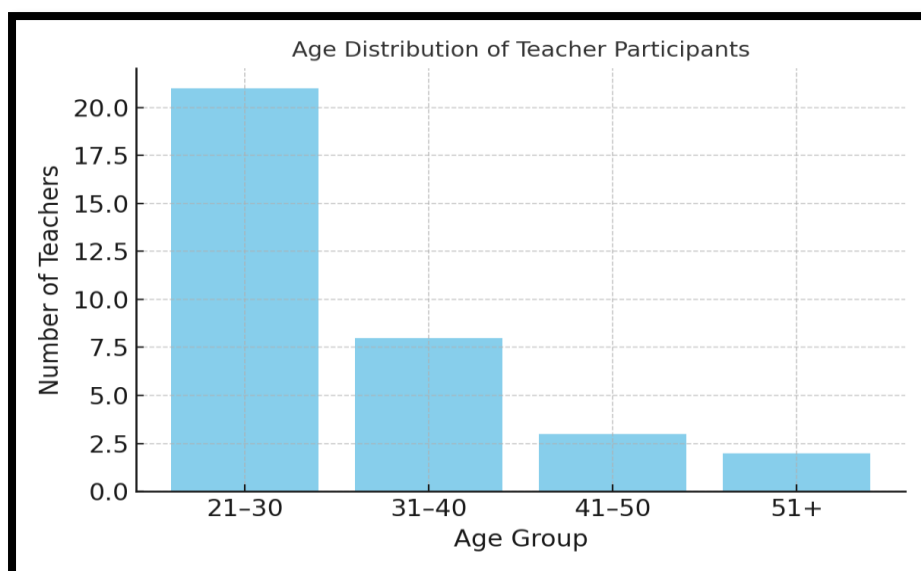


Figure 16, Age Distribution of EFL teacher participants

Item 3: Years of Teaching Experience

Teachers were asked to report the number of years they had been teaching. As illustrated in Figure 17, the sample shows a wide distribution of teaching experience levels. The most frequent response was 1 year, selected by 18 teachers, representing over half the participants (52.9%). Other teachers reported experience ranging from 2 to 35 years, including unique values such as 6, 11, 12, 14, 15, 18, 20, 23, 32, and 35 years. This distribution indicates a predominance of novice teachers in the sample, with some representation from more experienced individuals. The histogram in Figure 17 highlights the strong skew toward early-career professionals in this EFL teaching context. The mean teaching experience was $M = 6.91$, with a median of $Md = 1.0$, a standard deviation of $SD = 9.54$, and a total of 221 combined years of experience.

Statistic	Value
Mean (M)	6.91
Median (Md)	1.0
Standard Deviation (SD)	9.54
Sum	221

Table 7. Descriptive Statistics for Years of Teaching Experience

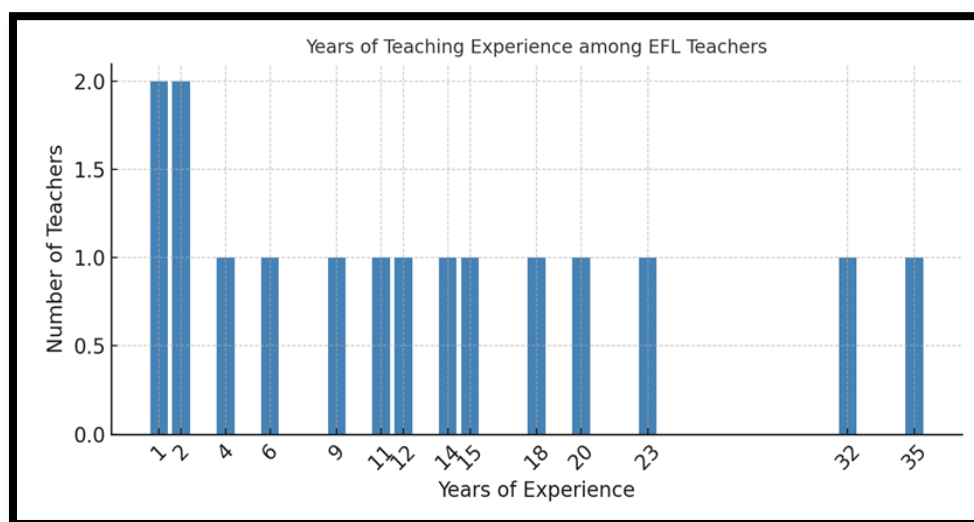


Figure 17. Self-reported Years of Teaching Experience among EFL teachers

- **Section Two : Teaching Strategies and Resources**

Item 4: Preferred Vocabulary Teaching Strategies

This question allowed teachers to select the vocabulary teaching strategies they found most effective. Among the five listed methods, flashcards were the most widely chosen, selected by 20 teachers (58.8%). 12 teachers (35.3%) selected multimedia resources, while collaborative learning and context-based instruction were each chosen by 11 teachers (32.4%). Word maps were the least preferred strategy, with only 6 teachers (17.6%) selecting them. These results highlight that while traditional tools like flashcards remain popular, there is also considerable interest in interactive and contextual strategies. Such preferences align with modern approaches to vocabulary acquisition, which emphasize contextualization, multimodal input, and social learning.

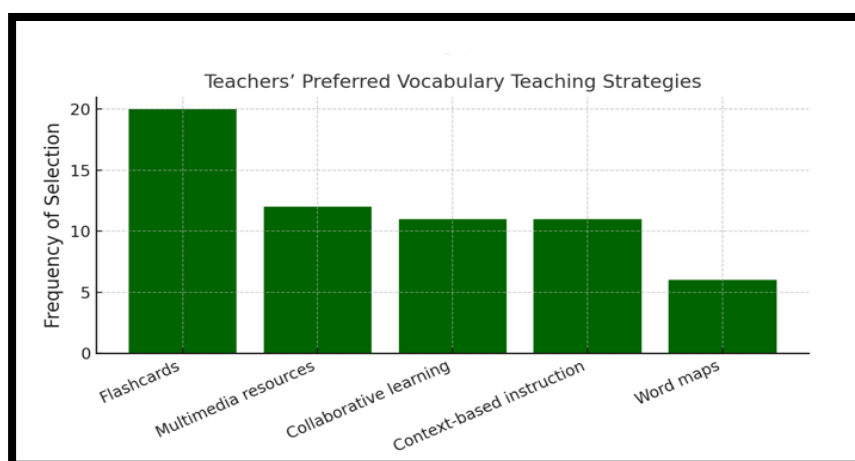


Figure 18. Frequency of Teachers Selecting each Vocabulary Teaching Strategie

Item 5: Frequency of Gamified Learning Activities

This item explored how often teachers integrate interactive or gamified learning experiences into their vocabulary lessons. A majority of teachers selected 'Sometimes' (55.9%), indicating periodic but not routine use of gamification. Additionally, 26.5% reported

'Always', and 14.7% reported 'Often'. Only one respondent chose 'Rarely', and none selected 'Never'. The mean score was 3.65 (SD = 0.92) on a 5-point scale (1 = Never, 5 = Always), suggesting a

Moderate-to-high incorporation of gamified learning. These findings imply that most EFL teachers recognise the motivational value of gamified instruction, even if it is not embedded in every lesson. This is significant for the current research, as it supports the broader applicability of digital tools like Duolingo, which rely on gamification principles.

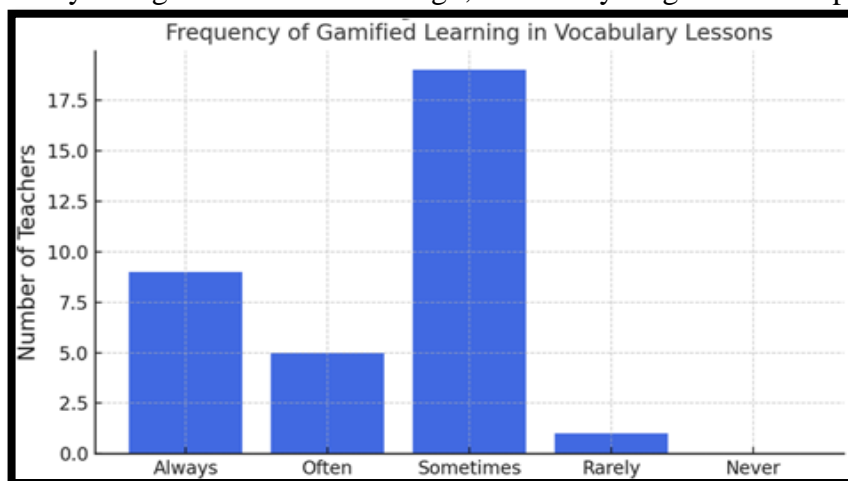


Figure 19. Frequency of using gamified learning strategies in vocabulary lessons

Item 6: Agreement with Contextualized Vocabulary Learning

This item evaluated teachers' agreement with the statement: "Contextualising vocabulary learning improves student retention and understanding." An overwhelming majority of teachers either agreed or strongly agreed. Specifically, 52.9% strongly agreed and 44.1% agreed, while only one teacher remained neutral. No respondents expressed disagreement. The mean score was 4.50 with a standard deviation of 0.56 on a 5-point scale (1 = Strongly Disagree, 5 = Strongly Agree), demonstrating a very high level of consensus. This reflects the foundational role of context in vocabulary acquisition, supporting strategies that move beyond isolated word memorisation. It also aligns with the educational design of Duolingo, which presents vocabulary in contextualised sentences and interactive scenarios.

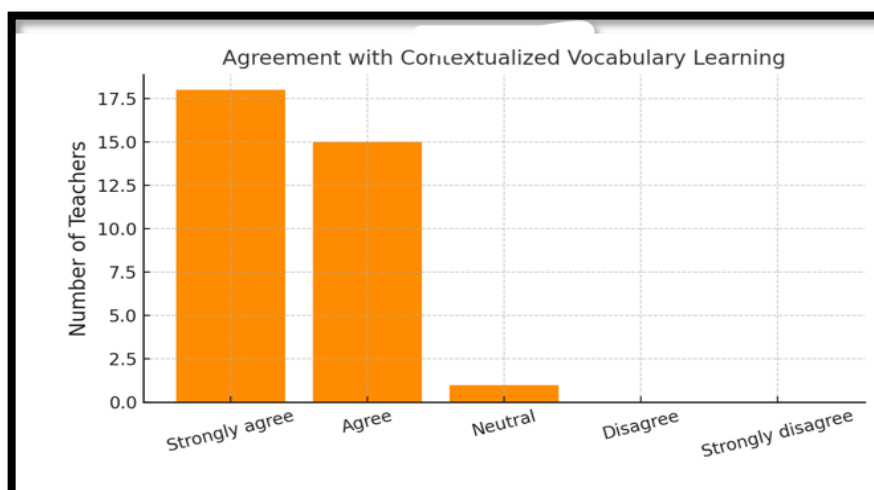


Figure 20. Teachers' agreement on contextualised vocabulary learning

Item 7: Frequency of Assigning Extracurricular Vocabulary Activities

This item investigated how frequently teachers assign extracurricular activities such as vocabulary apps or online tools. The most common response was 'Rarely' (41.2%), followed by 'Sometimes' (23.5%) and 'Often' (20.6%). Only 5.9% said 'Always', while 8.8% selected 'Never'. The mean response was 2.74 (SD = 1.08) on a 5-point Likert scale, indicating a tendency toward infrequent use of extracurricular vocabulary tasks. These findings suggest that while some teachers incorporate digital tools like Duolingo into out-of-class practice, a majority still limit vocabulary instruction to in-class settings. This highlights a potential gap in leveraging self-paced digital environments to reinforce vocabulary learning beyond the classroom.

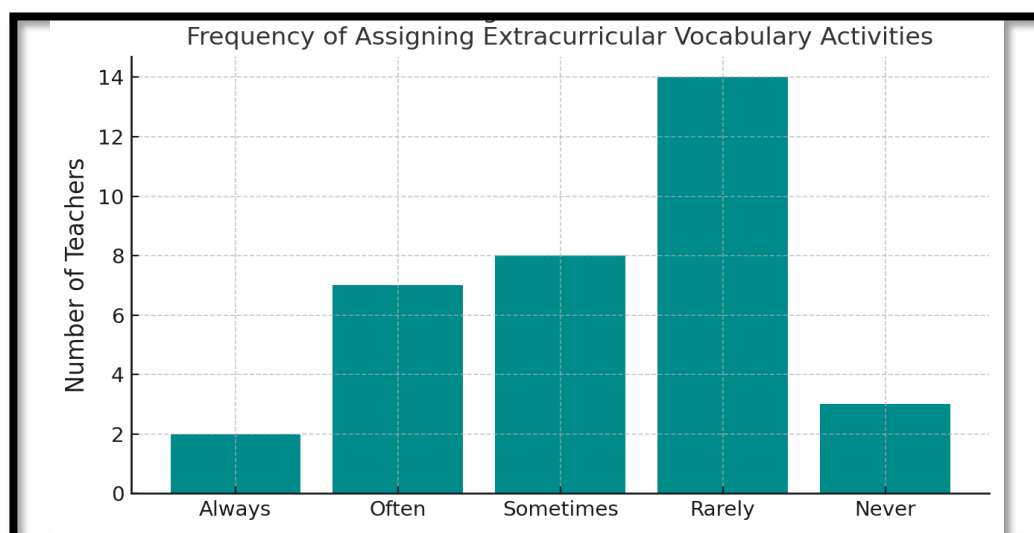


Figure 21. Teacher's Reported Frequency of Assigning Extracurricular Vocabulary Tasks

Item 8: Effectiveness of Multimedia Resources

This item assessed teachers' perceptions of the effectiveness of multimedia resources, such as videos, audio clips, and visual aids, for supporting vocabulary acquisition. Responses were strongly favourable, with 70.6% of teachers rating these resources as 'Very effective' and 23.5% rating them as '4' on a 5-point scale. Only 5.9% gave a neutral score of '3', and no respondents rated multimedia resources as ineffective. The mean score was 4.65; the median was 5, with a standard deviation of 0.60. The total score sum for all responses was 158, indicating a highly positive perception overall. This aligns with contemporary language learning approaches emphasising multimodal input and supports the rationale for integrating tools like Duolingo, which combine audio-visual elements to reinforce vocabulary knowledge.

Statistic	Value
Mean	4.65
Standard Deviation	0.6
Median	5.0
Sum	158

Table 8. Descriptive statics for Teacher's ratings

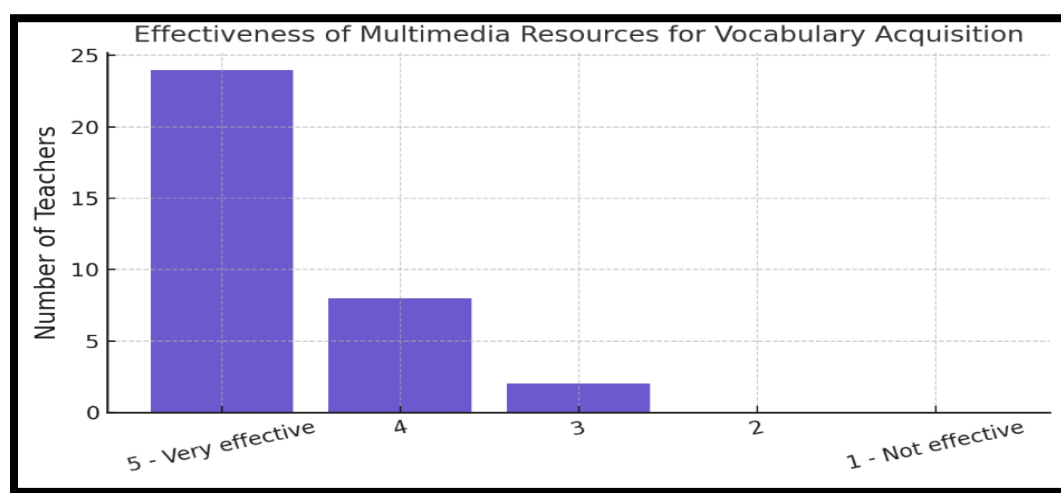


Figure 22. Teachers' rating of multimedia effectiveness for vocabulary learning.

• Section Three : Duolingo Use and Perceptions

Item 9: Teachers' Familiarity with Duolingo

This item assessed whether teachers were familiar with Duolingo as a vocabulary learning application. Out of the 34 participants, 26 teachers (76.5%) responded 'Yes', indicating prior knowledge or experience with the platform, while 8 teachers (23.5%) responded 'No'. This suggests that a significant majority of the teacher population is aware of Duolingo, which is an important prerequisite for meaningful adoption in extracurricular vocabulary instruction. Familiarity with educational technology is often a predictor of willingness to integrate it into teaching practice.

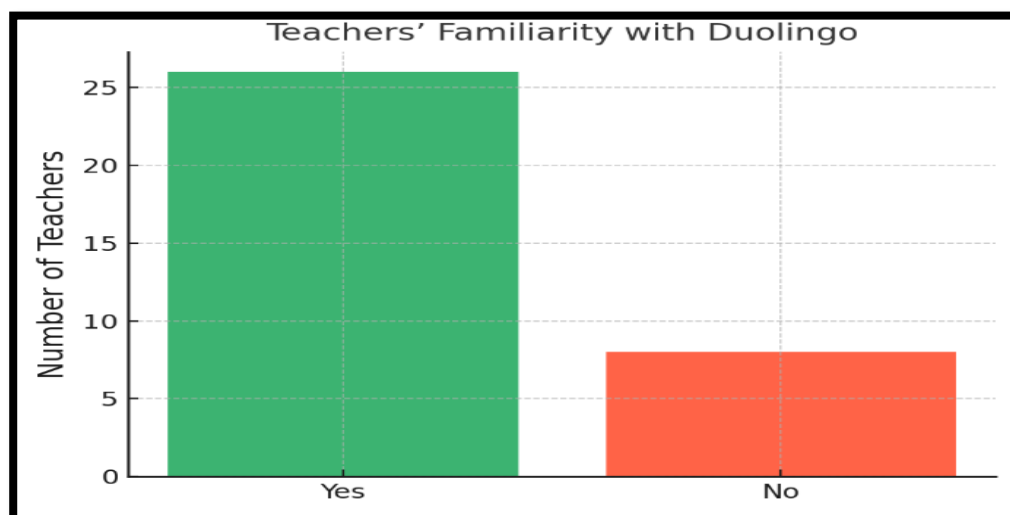


Figure 23. Teachers' familiarity with Duolingo.

Item 10: Frequency of Student Use of Duolingo

This item investigated how often students were reported to use Duolingo outside the classroom. According to teachers, 47.1% of students use it 'Rarely', 26.5% 'Never', and only 20.6% use it 'Several times a week'. Responses of 'Daily' and 'Once a week' were each selected by only 2.9% of teachers. The mean frequency score was 2.12 (SD = 1.17) on a 5-point scale (1 = Never, 5 = Daily), reflecting low general usage. This suggests that while many teachers recognize Duolingo, its integration into learners' routines remains limited. This low frequency may influence the perceived effectiveness of such tools in reinforcing vocabulary outside formal instruction.

Statistic	Value
Mean (M)	2.12
Standard Deviation (SD)	1.17
Median	2.00
Sum	45

Table 9. Descriptive Statistics of Teachers' Reports of Student Duolingo Usage

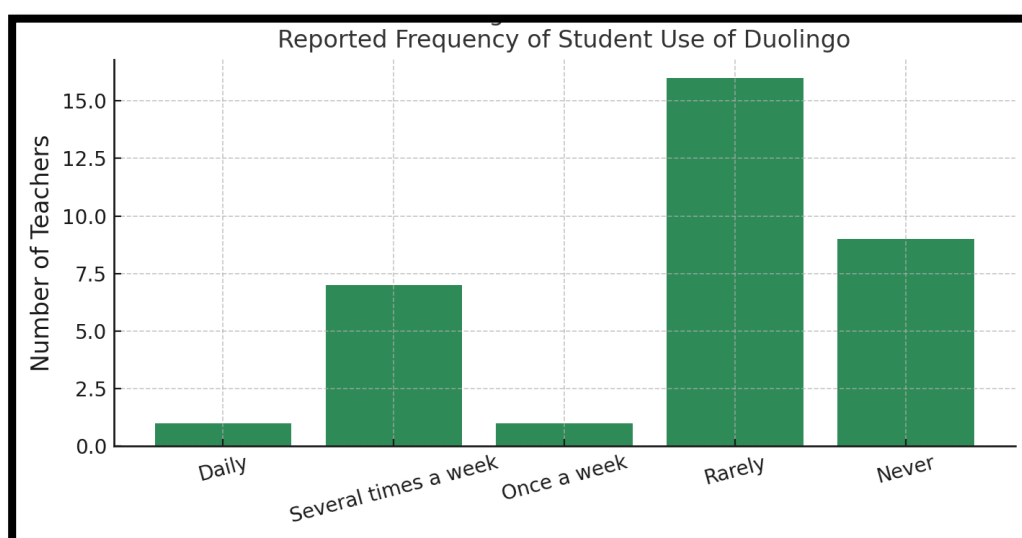


Figure 24. Frequency of student use of Duolingo outside the classroom

Item 11: Duolingo's Complementarity with Teaching

This item assessed how teachers perceive Duolingo in relation to their classroom vocabulary instruction. More than half of respondents (55.9%) chose 'Neutral', indicating uncertainty or mixed views about Duolingo's complementary role. 23.5% said it 'Complements' their teaching, while 11.8% responded 'Rarely complements', and 8.8% selected 'Strongly complements'. Only one teacher (2.9%) felt it 'Does not complement' instruction. The average rating was 2.94 (SD = 1.00) on a 5-point scale, indicating a generally cautious outlook. These results suggest that while a number of teachers see value in using Duolingo to reinforce classroom learning, many remain ambivalent, potentially due to a lack of formal integration or training on effective usage.

Statistic	Value
Mean (M)	2.94
Standard Deviation (SD)	1.00

Table 10. Descriptive Statistics for Duolingo Complementarity Ratings

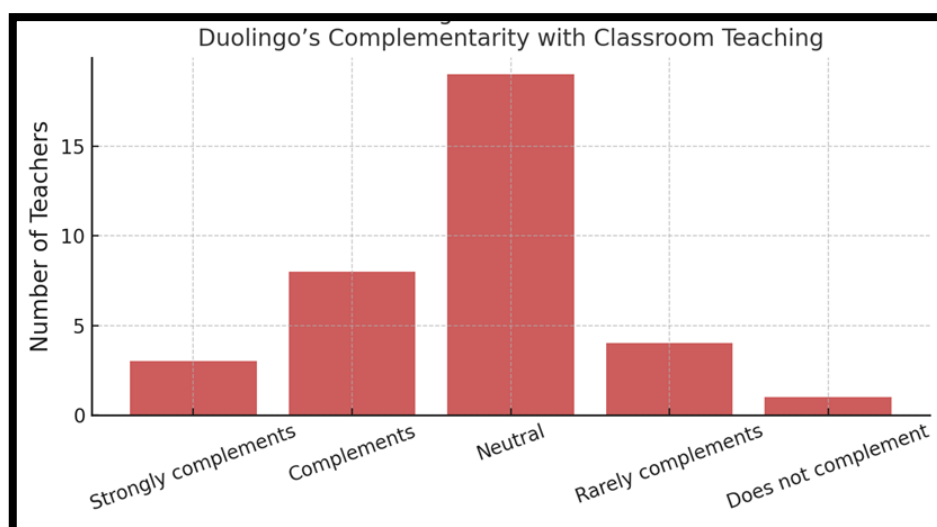


Figure 25. Teachers' perceptions of Duolingo's complementarity with classroom teaching.

Item 12: Perceived Vocabulary Improvement from Duolingo

This item asked teachers whether they observed any improvement in students' vocabulary skills due to Duolingo usage. Nearly half (47.1%) of respondents perceived 'Some improvements', while 11.8% saw 'Significant improvements'. However, 29.4% of teachers were 'Unsure', and 11.8% reported 'No noticeable change'. The mean score was 2.74 with a standard deviation of 0.97 on a 4-point scale (1 = No noticeable change, 4 = Significant improvements). These results suggest that while many teachers recognize at least

moderate vocabulary gains from Duolingo, uncertainty remains, possibly due to inconsistent student usage or lack of direct assessment of progress.

Statistic	Value
Mean (M)	2.74
Standard Deviation (SD)	0.97

Table 11.Descriptive Statistics for Vocabulary Improvement Ratings

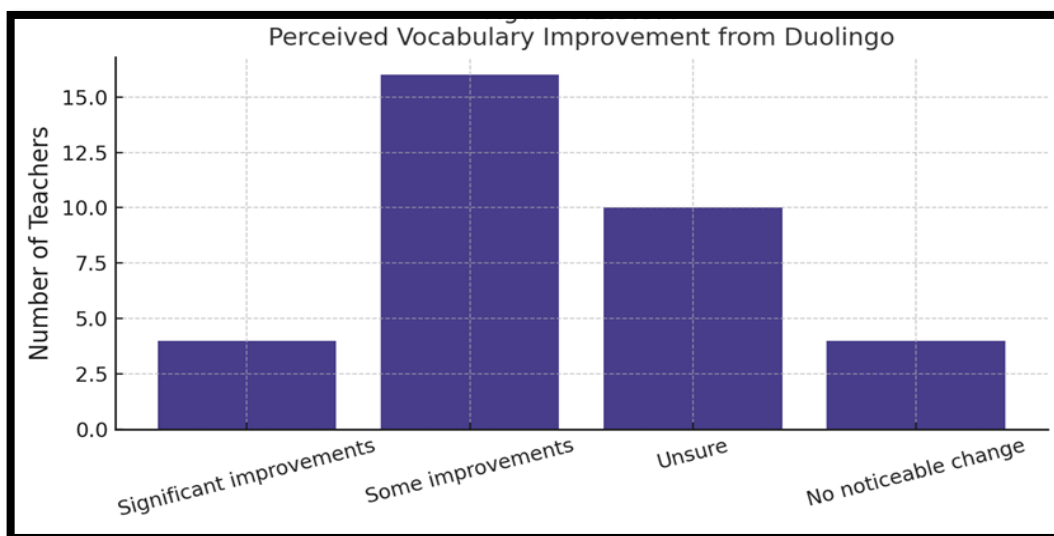


Figure 26.Teachers' perceptions of vocabulary improvement resulting from Duolingo use.

Item 13: Motivation Differences between Duolingo Users and Non-Users

This item explored whether teachers observed a motivational difference between students who use Duolingo and those who do not. A majority of teachers (55.9%) reported that Duolingo users appeared more motivated. However, 35.3% were unsure, and 8.8% felt there was no noticeable difference. These results suggest that while more than half of the teachers believe Duolingo fosters increased student engagement, a substantial number either remain undecided or have not perceived a clear impact. This variation in perception may relate to differences in how actively students use the app or how closely teachers monitor their usage.

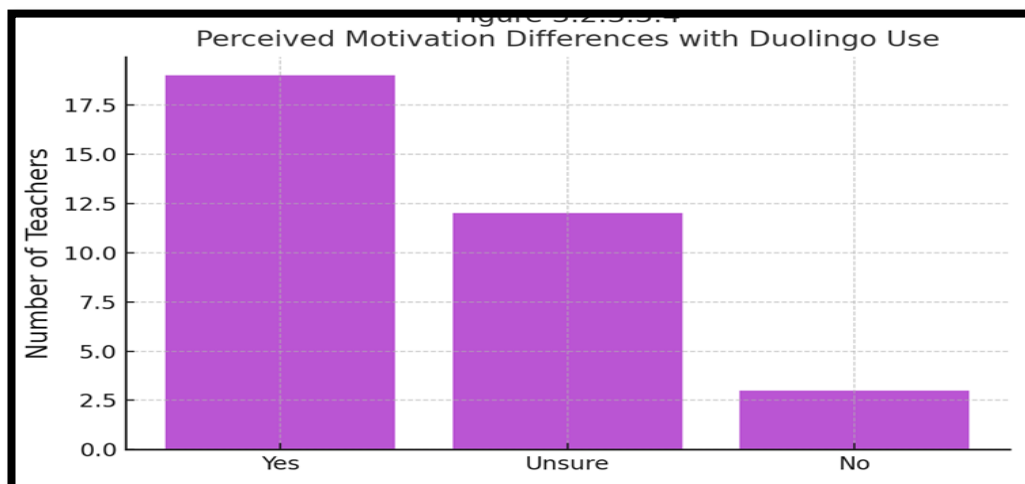


Figure 27.Teacher perceptions of motivation among Duolingo users versus non-users.

Item 14: Observed Vocabulary Improvement from Duolingo

This item examined whether teachers observed vocabulary improvements in students who used Duolingo. Nearly half of the teachers (47.1%) noted 'Some improvements', while 11.8% reported 'Significant improvements'. An equal number (11.8%) saw 'No noticeable change', and 29.4% were 'Unsure'. The mean response was 2.59 (SD = 0.91), with a median of 3 and a total score sum of 88. This indicates a moderate perception of improvement, although some uncertainty persists. These findings may reflect variability in students' engagement levels or differing expectations of vocabulary gains via mobile apps.

Statistic	Value
Mean	2.59
Standard Deviation	0.86
Median	3.0
Sum	88

Table 12. Descriptive statistics for vocabulary improvement ratings.

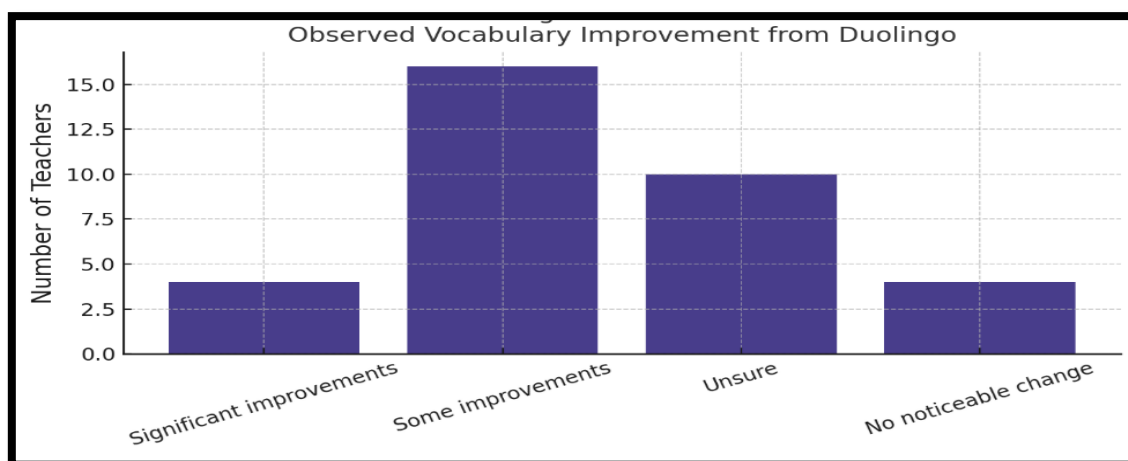


Figure 28. Teachers' observations of vocabulary improvement from Duolingo

• Section Four : Student Engagement and Perceived Impact

Item 15: Influence of Gamified Activities on Student Engagement

This item explored the perceived impact of gamified or interactive activities on students' engagement in vocabulary lessons. Among the respondents, 61.8% selected 'Positively', 32.4% chose 'Very positively', and only 5.9% selected 'Neutral'. No negative responses were recorded. The average rating was 2.26 on a 3-point scale (1 = Neutral, 3 = Very positively), with a standard deviation of 0.53, a median of 2, and a total score of 77. These findings indicate a strong perceived benefit of gamified learning for maintaining or enhancing student engagement. This supports the theoretical and pedagogical rationale for

using tools like Duolingo, which are designed around interactive, game-based principles.

Statistic	Value
Mean	2.26
Standard Deviation	0.57
Median	2.0
Sum	77

Table 13.Descriptive statistics for engagement ratings

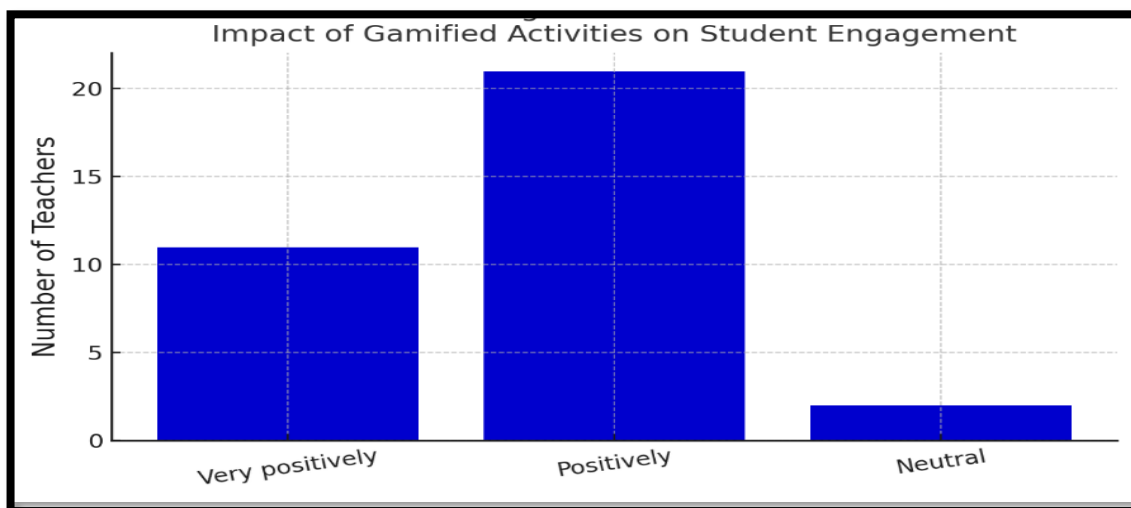


Figure 29. Teacher perceptions of how gamified activities influence student engagement.

Item 16: Support Measures to Help Students Overcome Duolingo Challenges

This item examined the support strategies that teachers believe could help students overcome challenges related to using Duolingo. The most frequently selected responses were 'More classroom integration' and 'Teacher guidance', each chosen by 50% of teachers. 44.1% suggested 'Peer support', and 32.4% selected 'Additional resources'. These multiple-response results suggest that most teachers favor guided and collaborative methods to enhance Duolingo's effectiveness. This reinforces the notion that digital tools are more impactful when used in conjunction with in-class scaffolding and social learning strategies

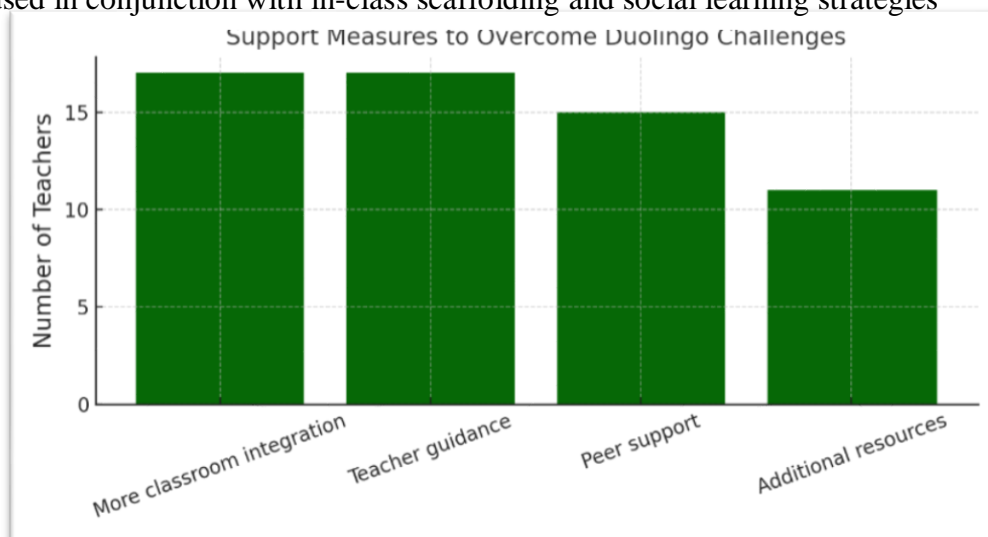


Figure 30. Support strategies proposed to assist students using Duolingo

Item 17: Effectiveness of Duolingo's Vocabulary Exercises

This item asked teachers to rate the effectiveness of Duolingo's vocabulary exercises in promoting language acquisition. 50% of respondents found them 'Effective', and 29.4% rated them as 'Very effective'. 17.6% were 'Neutral', while only one respondent (2.9%) considered the exercises 'Ineffective'. The mean rating was 3.24 (SD = 0.80), with a median of 3 and a sum total of 110. These results suggest general satisfaction with Duolingo's core vocabulary content and activities, reinforcing its credibility as an extracurricular language tool.

Statistic	Value
Mean	3.06
Standard Deviation	0.78
Median	3.0
Sum	104

Table 14. Descriptive statistics for vocabulary exercise effectiveness ratings

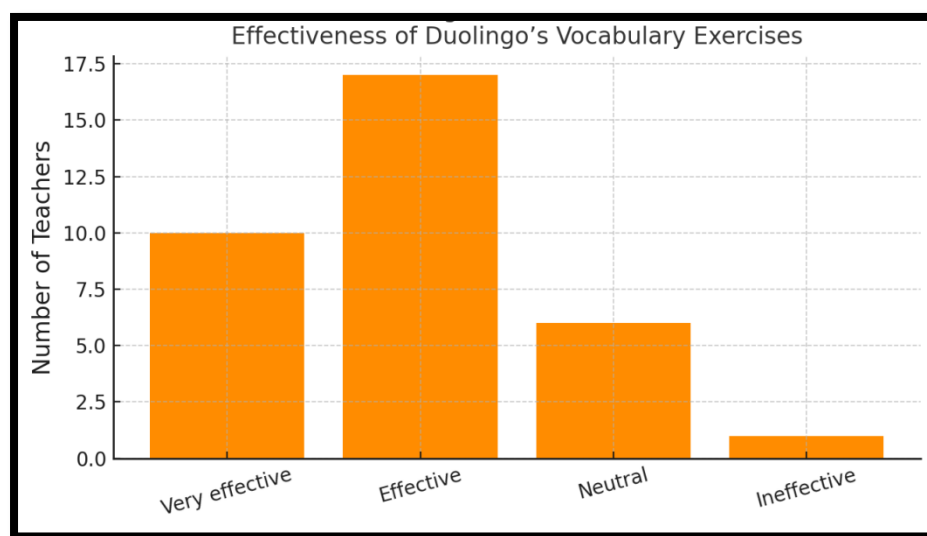


Figure 31. Teachers' evaluation of Duolingo's vocabulary exercises

Item 18: Duolingo's Reinforcement of Vocabulary in Context

This item assessed whether teachers believe that Duolingo reinforces vocabulary through contextual use. 52.9% of teachers agreed, while 35.3% strongly agreed. Only a small number were neutral (8.8%) or disagreed (2.9%). The mean score was 3.41 (SD = 0.77), the median was 3, and the total score sum was 116. These responses indicate that most teachers perceive Duolingo as promoting vocabulary retention through contextual exposure, which is consistent with communicative and cognitive approaches to second language acquisition.

Statistic	Value
Mean	3.21
Standard Deviation	0.73
Median	3.0
Sum	109

Table 15.Descriptive statistics for contextual reinforcement ratings

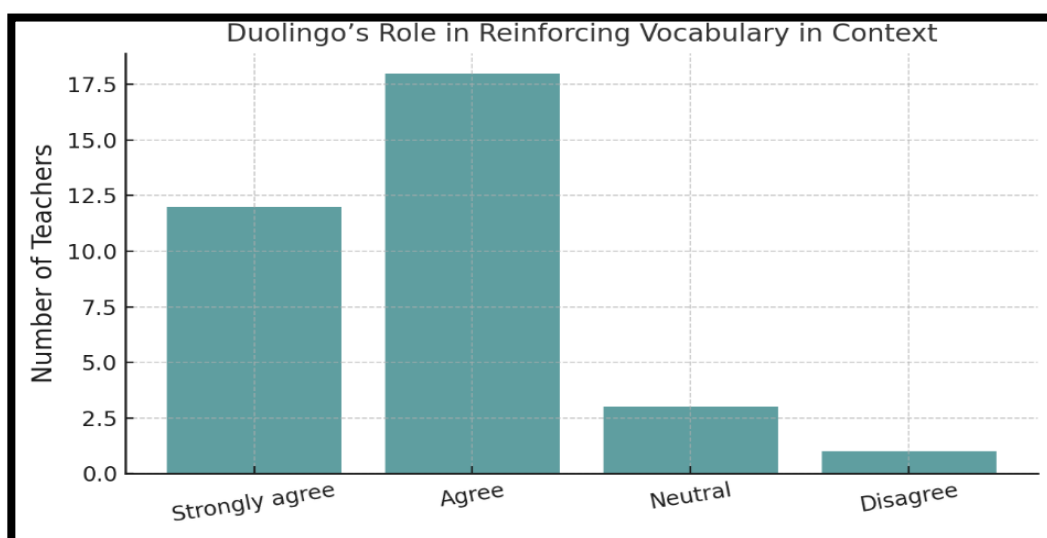


Figure 32.Teachers' agreement on Duolingo reinforcing vocabulary through context

Item 19: Duolingo's Support for Independent Learning

This item explored whether teachers believe Duolingo supports students' independent learning skills. Out of 34 teachers, 35.3% strongly agreed, and 44.1% agreed with the statement. 14.7% remained neutral, while 5.9% disagreed. The mean rating was 3.09 (SD = 0.91), the median was 3, and the total score sum was 105. These responses suggest a generally favorable view of Duolingo as a tool for encouraging autonomous vocabulary development, though some uncertainty about its reliability as a standalone method remains.

Statistic	Value
Mean	3.09
Standard Deviation	0.87
Median	3.0
Sum	105

Table 16. Descriptive statistics for independent learning ratings.

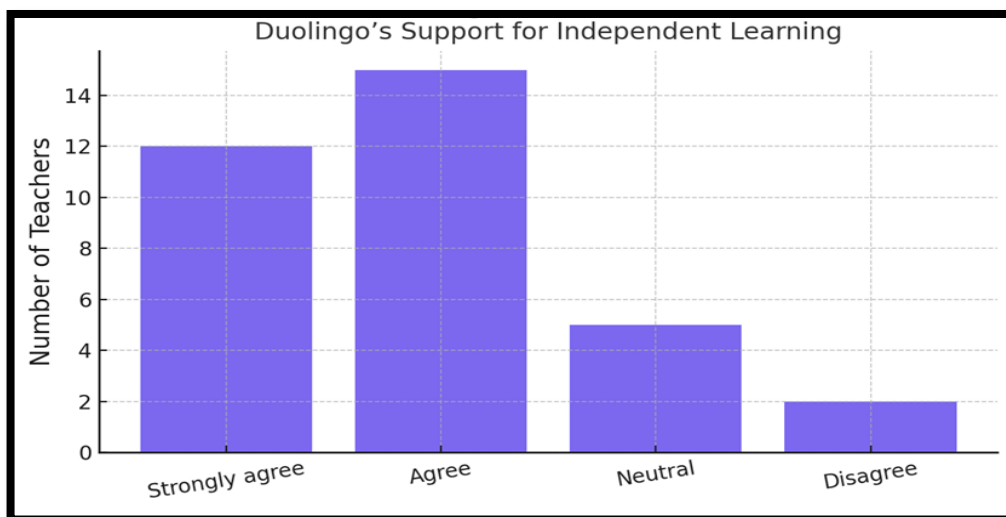


Figure 33. Teachers' views on Duolingo as a tool for independent learning

Item 20: Frequency of Teachers Encouraging Duolingo Use

This final item examined how often teachers actively encourage their students to use Duolingo for vocabulary learning. Most teachers responded 'Sometimes' (38.2%) or 'Rarely' (26.5%), while 17.6% reported 'Often' and 11.8% selected 'Always'. Only 5.9% of teachers stated they never encourage its use. The average frequency score was 3.29 (SD = 1.17), the median was 3, and the total score was 112. These results suggest that although many teachers recognize the value of Duolingo, consistent encouragement is not yet a common classroom practice. This may reflect varying levels of institutional support or personal confidence in app-based learning.

Statistic	Value
Mean	3.03
Standard Deviation	1.09
Median	3.0
Sum	103

Table 17. Descriptive statistics for frequency of teacher encouragement

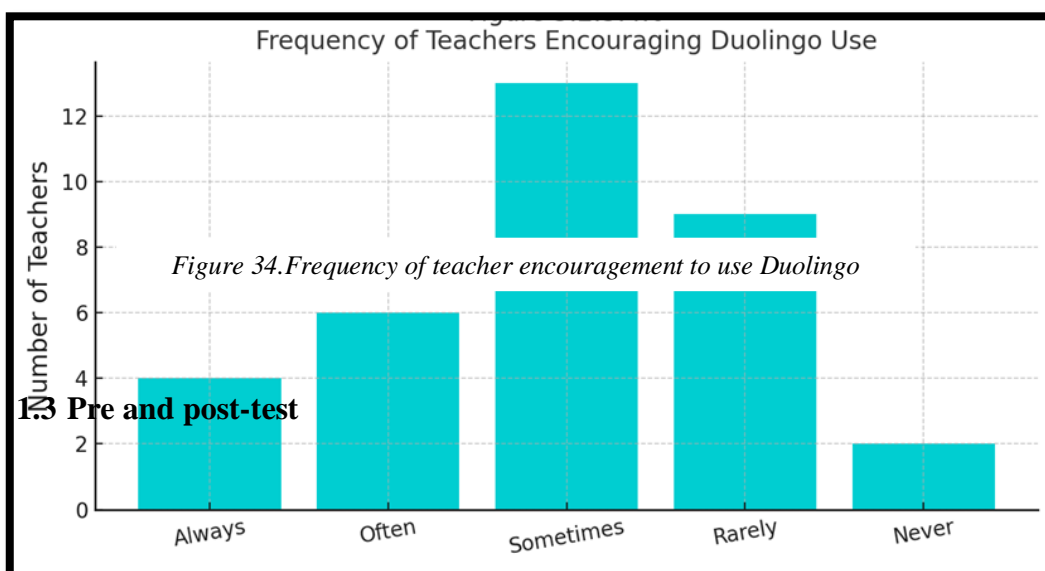


Figure 34. Frequency of teacher encouragement to use Duolingo

This section presents a comparative analysis of learners' vocabulary performance before and after the experimental intervention using Duolingo as a supplementary learning tool. The study involved two groups: an experimental group, which engaged with Duolingo over a one-week period, and a control group, which received no such intervention. All participants completed a vocabulary test prior to the intervention, followed by a post-test administered to both groups. Each test consisted of 30 items, with scores divided into receptive and productive vocabulary sections. Total scores were calculated by summing the correct responses from both parts. Paired samples t-tests were used to compare mean scores within each group to determine whether any significant changes occurred.

Group	N	Mean	SD	Min	Max	Median
Pre-test (All)	10	18.5	0.71	17	19	19
Post-test (Experimental)	5	20.0	0.00	20	20	20
Post-test (Control)	5	18.6	2.07	15	20	19

Table 18.Descriptive Statistics for Pre-test and Post-test Scores.

Comparison	t	p
Pre vs. Post (Experimental Group)	4.81	0.009
Post Experimental vs. Control	1.51	0.170

Table 19.Inferential Statistics for Pre-test and Post-test Comparisons

Each a paired-samples t-test was performed to assess whether there was a statistically significant difference in vocabulary performance before and after the intervention within the experimental group, which used Duolingo as a supplementary learning tool. The results revealed a statistically significant increase in post-test scores ($M = 20.00$, $SD = 0.00$) compared to the pre-test scores ($M = 18.5$, $SD = 0.71$), $t(4) = 4.81$, $p = .009$. This indicates that the use of Duolingo had a notable and positive impact on the vocabulary acquisition of learners in the experimental group. The mean increase in scores suggests that exposure to interactive, gamified vocabulary practice may reinforce learning outcomes, particularly when combined with traditional instruction.

In contrast, an independent-samples t-test was conducted to compare the post-test scores of the experimental and control groups. The analysis did not yield a statistically significant difference between the two groups, $t(8) = 1.51$, $p = .170$, even though the

experimental group had a slightly higher mean score ($M = 20.00$) than the control group ($M = 18.6$). This lack of statistical significance may be attributed to several factors. Firstly, the small sample size ($n = 5$ per group) may have limited the statistical power of the test, making it difficult to detect meaningful differences. Secondly, the performance level of the control group remained relatively high, indicating that both instructional approaches—traditional and technology-enhanced—might have been effective in facilitating vocabulary development to some degree. Thirdly, variation in teaching delivery, learner motivation, or familiarity with test formats could also have influenced the outcome.

Despite the absence of a significant difference in the between-group comparison, the within-group improvement in the experimental condition underscores Duolingo's potential as a valuable extracurricular tool in vocabulary instruction, particularly for encouraging learner autonomy and consistent engagement with language input.

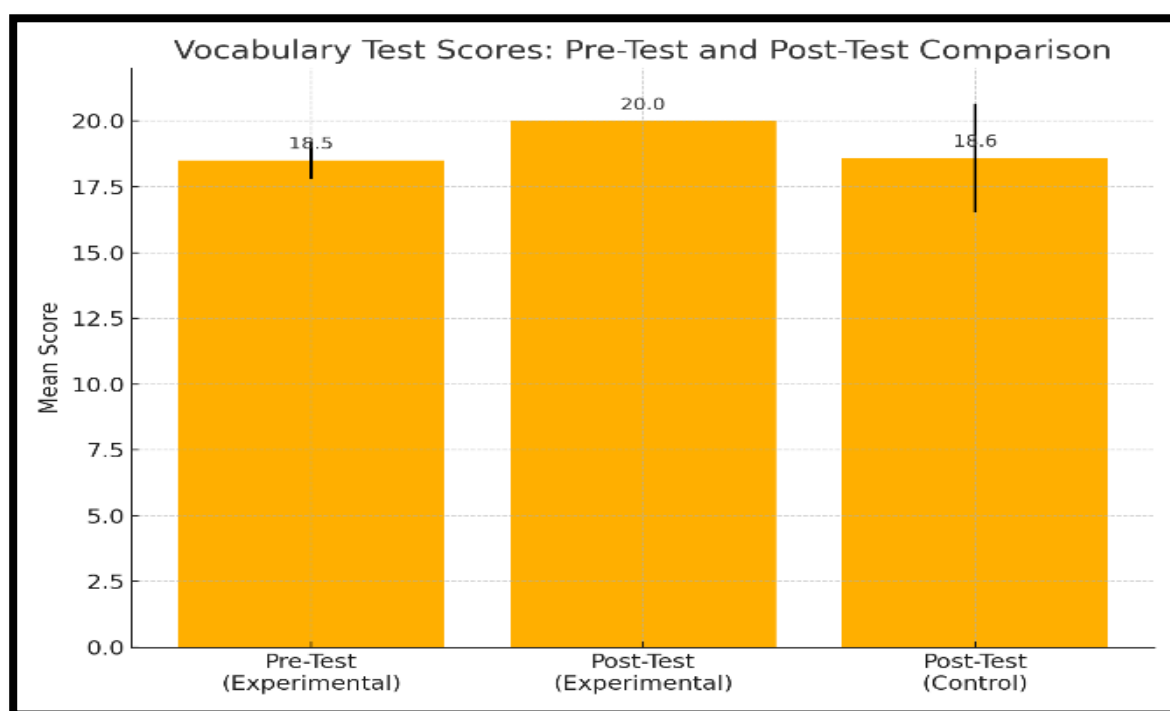


Figure 34. Comparison of Mean Vocabulary Scores across Pre-Test, Post-Test (Experimental), and Post-Test (Control) Groups

2 Qualitative Results

2.1 Students Questionnaire – Open-ended Responses

The open-ended responses from students were analyzed using a **thematic analysis** approach. This involved identifying recurrent patterns and grouping them into meaningful themes. Three major themes emerged:

Desire for Personalization and Variety

Perceived Educational Benefits

Recommendations and Reservations

Theme 1: Desire for Personalization and Variety

Students expressed a strong preference for a more adaptive and engaging learning experience on Duolingo.

Call for More Exercise Variety: A common concern was the repetitive nature of activities. Students requested additional types of exercises to sustain interest:

“It gets boring when you repeat the same thing. I want more games or situations like real life.”

Need for Detailed Feedback: Learners emphasized the value of receiving explanations for their mistakes to aid vocabulary retention:

“I want to know why the answer is wrong, not just that it's wrong.”

Request for Flexible Pacing: Several students mentioned that Duolingo's one-size-fits-all pace did not suit their needs:

“It should be slower sometimes or let me choose how fast I go.”

Lack of Local Language Support: A few students expressed difficulty due to the absence of Arabic support:

“I need Arabic sometimes to understand better.”

Theme 2: Perceived Educational Benefits

Despite critiques, many students saw Duolingo as a helpful tool for vocabulary learning.

Exposure to New Vocabulary: Duolingo was praised for introducing new words and helping with retention:

“It helps me remember new words because I see them more than once.”

Mistake-Friendly Learning Environment: Students valued the app's non-judgmental approach to learning:

“You can make mistakes and learn from them – it's not like school tests.”

Routine and Motivation: The gamified format and streak system encouraged regular practice:

“The points and rewards make me want to open the app every day.”

Theme 3: Recommendations and Reservations

Student views on whether Duolingo should be recommended were mostly positive, though some offered important caveats.

Widespread Endorsement: Many students recommended Duolingo for its accessibility and motivation:

“Yes, it’s easy and fun. It helps you learn quickly.”

“Yes, especially for people who are starting to learn English.”

Mixed Opinions on Depth: A few students suggested that while Duolingo is useful, it may not suffice for more advanced learners:

“It’s good in the beginning, but it doesn’t teach advanced vocabulary or grammar.”

Criticism of Relevance: Some students found it disconnected from their curriculum or daily language needs:

“It doesn’t help with what I learn at school. It’s too general.”

2.2 Teacher’s Questionnaire – Open-ended Responses

The qualitative responses from EFL teachers were analyzed thematically to identify common perceptions, challenges, and suggestions regarding vocabulary instruction and the use of Duolingo. The analysis revealed three core themes:

Effective Strategies for Vocabulary Instruction

Perceived Limitations of Duolingo Integration

Recommendations for Enhanced Support and Use

Theme 1: Effective Strategies for Vocabulary Instruction

Teachers shared various approaches they considered most effective for enhancing vocabulary acquisition. While multiple-choice options identified popular strategies such as flashcards and multimedia, the open-ended responses enriched these insights.

Experiential and Context-Based Learning: Teachers valued real-life scenarios and contextual exposure over rote memorization:

“One of the best strategies is through exposure to real-life situations using the target language.”

Academic Games and Varied Media: Several responses emphasized the use of gamified tasks and digital tools:

“Academic games are extremely helpful, especially when combined with visual or audio materials.”

Adaptability to Learner Needs: Some educators highlighted the need to tailor methods to specific learner profiles:

“Each class is different – I adapt depending on their interests and motivation levels.”

Theme 2: Perceived Limitations of Duolingo Integration

While most teachers were familiar with Duolingo, its integration into classroom instruction was met with hesitation or mixed views.

Ambivalence Toward Complementarity: Many teachers expressed uncertainty about Duolingo’s role in formal teaching:

“It can be helpful, but I’m not sure it aligns with what we’re doing in class.”

Student Engagement and Usage Barriers: Teachers noted that low or inconsistent student use diminished Duolingo’s potential impact:

“They rarely use it unless I push them. It’s hard to see results if it’s not regular.”

Technical and Linguistic Challenges: A few mentioned language barriers or tech limitations for students:

“Some students struggle with English-only instructions. Others face internet issues.”

Theme 3: Recommendations for Enhanced Support and Use

Teachers proposed several improvements to maximize the effectiveness of Duolingo and similar tools.

Classroom Integration and Teacher Involvement: There was strong consensus on the need to embed Duolingo within lessons and provide guided use:

“More classroom integration would make it feel like a real part of learning, not just homework.”

Training and Resources: Teachers called for more structured support to incorporate such apps meaningfully:

“We need training on how to use it properly – it shouldn’t just be for fun.”

Collaborative and Social Features: Some educators suggested that Duolingo include more interactive peer elements:

“Adding competitions or peer tasks would motivate students more.”

2.3 Semi-Structured Interviews with EFL Teachers

This section presents a thematic analysis of semi-structured interviews conducted with five EFL teachers. Each contributed insights into vocabulary teaching strategies, perceptions of Duolingo, and student challenges. The participants included:

- Razika Boussouri – Laghouat (Aflou)
- Samah Daoudi – Ghardaïa
- Achour Asma – Zeribet El Oued, Biskra

- Aya Salem – Online teacher for EFL students from various countries
- Sabrina Zouzou – Branis, Biskra.

Theme 1: Contextual and Communicative Approaches to Vocabulary Teaching

All five teachers emphasized contextualization as central to effective vocabulary instruction. Razika Boussouri explained that she always introduces new words in meaningful contexts and follows with repetition. Samah Daoudi employs the PPPU method (Presentation, Practice, Production, Use) and supplements it with visuals and realia. Achour Asma uses semantic mapping and real-life discussions, while Aya Salem favors interactive tools like games and flashcards. Similarly, Sabrina Zouzou integrates vocabulary into short stories or dialogues for contextual reinforcement.

Theme 2: Diverse and Adaptive Instructional Strategies

The teachers reported using a wide range of techniques tailored to their learners' levels and needs. Asma focuses on semantic mapping, morphology, and linking new words to students' lives. Samah integrates TPR and songs, especially with young learners. Aya combines repetition, role-plays, and flashcards to maintain engagement. Sabrina prefers games and visuals, while Razika includes pronunciation drills and speaking tasks in her routine.

Theme 3: Vocabulary Selection Criteria

Vocabulary selection is guided by curriculum requirements, learner level, and practical communication needs. All teachers stressed the importance of relevance and usefulness. Asma also considers frequency and student interest, and Aya aligns choices with lesson goals. Razika emphasized selecting high-frequency, applicable words to promote both speaking and writing fluency.

Theme 4: Assessment Methods for Vocabulary Learning

Teachers utilize both formative and summative assessment strategies. Sabrina and Razika conduct oral checks, quizzes, and regularly revisit vocabulary in later lessons. Asma uses semantic mapping, vocabulary journals, and delayed recall exercises. Aya assesses through games, sentence writing, and short speaking tasks, while Samah promotes peer interaction and real-life application.

Theme 5: Perceptions of Duolingo

Though most had not used Duolingo in their classrooms, the teachers were generally familiar with its features. Aya and Asma praised its motivating nature and role in independent learning. Razika appreciated its support for repetition and pronunciation. Samah saw potential in its gamified format for enhancing motivation, while Sabrina referenced positive

feedback from peers and learners.

Theme 6: Strengths and Limitations of Duolingo

Teachers acknowledged Duolingo's strengths: repetition, gamification, accessibility, and feedback. Razika, Aya, Samah, and Sabrine all found it user-friendly and engaging. However, they also agreed on its limitations: limited speaking practice, lack of contextual depth, and misalignment with curriculum goals. Razika, Samah, Asma, and Aya consistently raised these concerns.

Theme 7: Challenges Learners Face with Vocabulary Acquisition

Across interviews, teachers identified common learner challenges such as memorization, pronunciation, and contextual usage. All participants noted that vocabulary is easily forgotten without consistent review. Idiomatic expressions, academic vocabulary, and phrasal verbs were seen as especially difficult due to their abstract or culturally bound nature.

Theme 8: Duolingo's Role in Addressing These Challenges

Duolingo was seen as a partial support tool for vocabulary learning. Asma noted it aids recognition and recall but lacks support for production. Aya emphasized it works best as supplementary practice. Samah acknowledged its role in pronunciation and spelling, but said it's insufficient for deeper language use. Razika concluded that while helpful for beginners, it falls short in addressing more complex learning needs.

Conclusion

This chapter synthesized the results of both the quantitative and qualitative phases of the study, offering a comprehensive picture of vocabulary acquisition among Algerian EFL learners and the potential of Duolingo as an extracurricular tool.

Quantitative findings revealed that the experimental group using Duolingo experienced a statistically significant improvement in vocabulary scores from pre-test to post-test ($t(4) = 4.81, p = .009$). Although their post-test scores were higher than those of the control group, this difference was not statistically significant ($t(8) = 1.51, p = .170$), likely due to the small sample size. These results suggest a promising impact of Duolingo on vocabulary acquisition when used over a short period.

The student questionnaire data indicated mixed habits and attitudes toward vocabulary learning. While many students reported relying on traditional memorization and classroom instruction, a subset of learners who engaged with Duolingo noted its motivational and gamified features as particularly engaging. However, consistent and widespread use remained limited.

Teachers' questionnaire responses confirmed the low frequency of Duolingo use among students. Although most teachers acknowledged its potential as a supplementary tool, few reported integrating it formally into instruction. Barriers such as student access, motivation, and alignment with the national curriculum were noted.

Qualitative analysis of student open-ended responses highlighted the value they found in Duolingo's interactive, visual, and game-based format. Students appreciated features that supported spelling, pronunciation, and word recognition, although some voiced concerns about repetitiveness and lack of real-life contextual usage.

Teacher interviews further contextualized these findings. All five interviewed educators emphasized communicative and contextual approaches to vocabulary instruction, using methods like Total Physical Response, semantic mapping, games, and realia. Duolingo was viewed as a helpful tool for independent vocabulary practice, especially for beginner learners. However, its limitations in supporting productive language skills such as speaking and writing were consistently noted. Teachers also pointed out student difficulties in memorizing vocabulary, using idiomatic phrases, and applying new words accurately in context.

In summary, the findings suggest that while Duolingo is not a standalone solution, it holds valuable potential as a supplementary tool for enhancing vocabulary acquisition among EFL learners. When thoughtfully integrated with traditional classroom strategies, mobile-assisted platforms like Duolingo can help increase learner engagement, reinforce word

recognition, and provide accessible practice beyond the school setting. However, limitations in speaking and contextual application highlight the need for balanced instructional design. These findings lay the groundwork for the next chapter, which will interpret the results in greater depth, discuss their pedagogical implications, and offer recommendations for future teaching practice and research.

Chapter Four

Chapter Four: Synthesis and Interpretation of Findings

Introduction

This chapter discusses and interprets the main findings of the study, which explored how effective teaching strategies combined with the use of Duolingo as an extracurricular tool can enhance vocabulary acquisition among Algerian high school EFL learners. The aim of the research was to address persistent challenges in vocabulary learning by evaluating both traditional and digital approaches, with a particular focus on the potential of mobile-assisted language learning in under-resourced public school contexts. The chapter is organized as follows: it begins by comparing the quantitative results, including pre-test and post-test analyses, and examines how student and teacher questionnaire responses shed light on learning habits and perceptions. It then interprets qualitative findings from student open-ended responses and teacher interviews, highlighting recurring themes and critical feedback. The discussion further considers the implications for EFL teaching in Algeria, acknowledges the study's limitations, and offers recommendations for practice and future research. In doing so, this chapter aims to provide a comprehensive understanding of how blended strategies integrating both traditional and digital tools—can support vocabulary development and learner engagement, while also identifying the practical and systemic factors that influence their effectiveness.

1. Interpretation of Findings

1.1 Quantitative Findings

This section explains the main results from the tests and questionnaires, focusing on what they mean for vocabulary learning and teaching.

➤ *Pre-test vs. Post-test Analysis*

The pre-test and post-test were given to two groups: an experimental group that used Duolingo for one week, and a control group that did not use any extra vocabulary tools. Both tests measured receptive and productive vocabulary using multiple-choice, fill-in-the-blank, and short-answer items.

After the intervention, the experimental group showed a clear improvement in vocabulary scores compared to their pre-test results. The increase was seen in both receptive and productive vocabulary, but the improvement was more noticeable in recognizing and recalling words than in producing them in context. The control group's scores remained

mostly the same.

However, when comparing the post-test results between the two groups, the difference was not large enough to be considered statistically significant for all vocabulary areas. This suggests that while Duolingo helped students remember more words over a short period, it did not lead to a strong difference in overall vocabulary performance compared to traditional methods, especially for using words in sentences

➤ *Student Questionnaire*

The Student questionnaire results showed that watching English media was the most frequently used vocabulary-learning strategy, followed by language learning apps. Flashcards, although less frequently used, were rated highest in effectiveness ($M = 3.10$, $SD = 0.99$), supporting Hypothesis 1 that interactive strategies can enhance vocabulary acquisition. Word maps followed ($M = 2.62$, $SD = 0.73$), while context-based learning and apps like Duolingo received lower effectiveness ratings. Despite this, Duolingo was rated positively in supporting vocabulary retention ($M = 3.90$, $SD = 1.19$), again reinforcing Hypothesis 2. Motivation levels were moderate when using Duolingo ($M = 3.85$, $SD = 1.29$). Most students found gamified elements like challenges and rewards engaging. This supports Hypothesis 3 that gamified learning environments increase motivation and engagement.

➤ *Teacher's Questionnaire*

Teacher responses revealed limited integration of Duolingo in classroom practice. While 76.5% were familiar with Duolingo, few encouraged frequent use. The perceived frequency of student use was low ($M = 2.12$, $SD = 1.17$). Teachers observed some vocabulary improvements ($M = 2.74$, $SD = 0.97$), but most were neutral on whether Duolingo complemented instruction ($M = 2.94$, $SD = 1.00$). These results provide mixed support for Hypotheses 4 and 5. While students preferred Duolingo over traditional methods (supporting Hypothesis 4), its integration with traditional strategies was not strongly evident, offering only partial support for Hypothesis 5. While Duolingo is recognized and somewhat effective in enhancing vocabulary, its full integration into classroom teaching practices is yet to be realized, highlighting a gap between teacher familiarity and active encouragement of its use in language instruction.

1.2 Qualitative Themes

Open-Ended Student Responses

Thematic analysis of students' open-ended responses revealed several insights into their experiences with Duolingo. A key theme was a strong desire for more personalization and variety in exercises. Students expressed that repeated exposure to the same content

became monotonous and desired more diverse and context-rich tasks. They also appreciated the opportunity to learn at their own pace but noted the lack of explanations for wrong answers as a limitation. This aligns with Hypothesis 6, highlighting the need for additional instructional support to make Duolingo more effective.

Another prominent theme was the recognition of educational benefits, particularly in vocabulary recognition and spelling. Students described how repeated engagement through daily challenges supported memory retention and created a stress-free environment for learning. However, a minority of students expressed that Duolingo lacked sufficient relevance to their school curriculum or more advanced language features, suggesting the need for better alignment with classroom content.

➤ **Semi-Structured Teacher Interviews**

Interview data from five EFL teachers added depth to the questionnaire findings. All interviewees highlighted the value of contextualized and communicative methods in vocabulary instruction. For instance, Razika Boussouri emphasized presenting vocabulary in meaningful sentences followed by repetition. Samah Daoudi discussed using visual aids and the PPPU model, while Asma Achour incorporated semantic mapping and real-life scenarios. The teachers generally viewed Duolingo as a useful tool for reinforcement, particularly for beginners, but noted that it should not replace traditional classroom methods. They pointed out that while Duolingo promotes independent practice, it falls short in developing speaking and productive vocabulary skills—thus only partially supporting Hypotheses 2 and 5. Additionally, teachers identified several learner challenges in vocabulary acquisition, including difficulties with memorization, pronunciation, and idiomatic expressions. They suggested that combining Duolingo with targeted classroom strategies, such as guided discussions, peer activities, and teacher-led reviews, could address these issues, thereby supporting Hypothesis 6.

1.3 Comparison with Literature

Interview The findings of this study resonate with and extend key theoretical frameworks explored in the literature. In particular, the observed outcomes align with established models of vocabulary acquisition, including Nation's (2001, 2013) principles of frequency and repetition, Krashen's (1985) Input Hypothesis, and Schmitt's (1997) taxonomy of vocabulary learning strategies. This section synthesizes how the empirical data of the present research supports, nuances, or challenges these models, thereby situating the study within broader scholarly discourse.

The experimental group's statistically significant vocabulary gains after a brief

Duolingo intervention echo Nation's emphasis on repeated, high-frequency exposure. Duolingo's curriculum, which prioritizes foundational lexical items and employs spaced repetition, effectively mirrors Nation's proposition that frequent encounters with core vocabulary accelerate lexical acquisition. This alignment suggests that mobile-assisted vocabulary practice can achieve measurable improvements, even in short-term implementations, thereby lending support to Hypothesis 2.

Krashen's Input Hypothesis emphasizes the role of comprehensible input slightly beyond the learner's current level ($i+1$) as the engine of acquisition. Duolingo's lesson progression reflects this principle, providing incrementally more complex input and feedback in manageable segments. Students' perceptions of Duolingo as engaging and accessible reinforce Krashen's notion that reducing affective filters—such as anxiety or lack of confidence—can enhance language acquisition. The gamified, low-stakes environment Duolingo offers may have contributed to positive affective conditions that facilitated learning, particularly for learners less confident in formal instructional settings.

Schmitt (1997) identified multiple strategy types for effective vocabulary learning, including cognitive and metacognitive techniques. The study's findings—especially students' reliance on flashcards and teachers' endorsement of contextual teaching—underscore the continued relevance of diverse strategies. Duolingo's integration of semantic clustering, pictorial support, and immediate feedback aligns with Schmitt's framework and reflects an operationalization of cognitive strategies that are easily adaptable for independent learning contexts. Moreover, students' appreciation of structured routines and progress tracking suggest that Duolingo also supports metacognitive awareness, consistent with Schmitt's model.

Constructivist learning theory (Piaget, Vygotsky, Bruner) also finds a parallel in the data. Teachers emphasized scaffolding, contextual application, and learner engagement, while students advocated for more diverse and personally relevant content. These findings support the view that vocabulary learning is most effective when students actively construct meaning, negotiate usage in communicative settings, and receive support tailored to their developmental needs. Duolingo's interactive sentence-based tasks, while limited in depth, offer some grounding in constructivist principles. However, as teachers noted, the app lacks richer, socially mediated interactions—limiting alignment with Vygotsky's sociocultural constructivism.

Vesselinov and Grego's (2012) evaluation of Duolingo's effectiveness also provides a relevant benchmark. Their findings of moderate, short-term vocabulary gains mirror the

results of this study. While this supports the validity of using Duolingo as a supplementary tool, it also cautions against overestimating its transformative potential when used in isolation. The control group's comparable performance further tempers any overinterpretation, reminding researchers and educators alike of the importance of integrated, context-rich instructional design.

Finally, the study's observations affirm the lexical approach advocated by Lewis (1993), which positions collocations and lexical chunks as the foundation of communicative competence. Duolingo's phrase-based instruction models this approach effectively, allowing learners to internalize syntactic patterns through meaningful exposure. However, teachers' concerns about the lack of productive output suggest that the platform falls short in advancing learners from receptive recognition to expressive use, a distinction emphasized by Read (2000) and Schmitt (2000).

In conclusion, this study affirms key insights from SLA theory and vocabulary pedagogy. It demonstrates how Duolingo, when framed as part of a holistic strategy, can contribute meaningfully to vocabulary learning. However, the findings also highlight the platform's limitations in promoting deeper lexical depth, productive use, and communicative fluency. These observations reinforce the need for balanced integration, where digital tools complement, but do not substitute the interactive and nuanced work of classroom-based instruction

1.4 The Implications of The Study

The findings of this study offer several noteworthy implications for vocabulary instruction within Algerian EFL classrooms, particularly in light of the growing presence of mobile-assisted language learning platforms like Duolingo. While not intended to replace traditional pedagogical methods, Duolingo presents distinct affordances that can be harnessed to complement and enhance existing teaching practices.

Firstly, the data underscore the pedagogical value of combining traditional strategies—such as flashcards, semantic mapping, and contextual instruction—with technology-mediated activities. Students and teachers alike demonstrated a preference for context-rich, repetitive exposure to vocabulary, a model that Duolingo partially fulfills through structured, spaced repetition and theme-based learning. Teachers are therefore encouraged to adopt a blended approach, whereby Duolingo exercises are used to reinforce vocabulary taught in class, particularly for foundational and high-frequency lexical items.

Secondly, the motivational aspect of Duolingo warrants attention. The platform's gamified elements—such as progress streaks, XP points, and visual feedback—contributed to

increased learner engagement, as evidenced by questionnaire and interview data. While not universally preferred, these features provided an appealing environment for learners who benefit from structured yet self-paced learning. Educators might consider leveraging these motivational tools by setting Duolingo-based homework tasks, integrating app usage into classroom competitions, or encouraging peer support networks around app activities. Nevertheless, for Duolingo to be pedagogically impactful, its use must be scaffolded. The absence of detailed explanations for errors, limitations in productive language use, and lack of alignment with national curricula were repeatedly identified as shortcomings. To mitigate these, teachers should provide complementary in-class activities that build on the vocabulary encountered in Duolingo, offer corrective feedback, and engage learners in communicative tasks where newly acquired words are actively used. Professional development opportunities could also help teachers make better use of the platform's potential, ensuring that its integration is not superficial or inconsistent.

Equally important is addressing access-related challenges. Despite high rates of smartphone ownership, some learners still face barriers due to limited internet access or shared devices. This raises questions about equity and inclusivity in implementing technology-based tools. Institutions may consider allocating time in computer labs for app use or providing offline alternatives where possible. Equity measures are essential to prevent digital tools from exacerbating existing disparities among learners.

Lastly, the study indicates a broader institutional need for alignment between emerging digital practices and established curricular objectives. The limited curricular integration observed suggests that a clearer framework or set of guidelines from educational authorities could facilitate more systematic adoption. Such guidelines might include suggested app-based activities aligned with textbook units, minimum usage expectations, and templates for progress monitoring.

In conclusion, the implications of this study point toward a strategic, supportive, and equitable approach to incorporating Duolingo into Algerian EFL classrooms. While not a substitute for communicative instruction, Duolingo's structured, gamified model offers meaningful opportunities for reinforcement, particularly when guided by knowledgeable teachers and embedded within a coherent instructional framework. These pedagogical recommendations are supported by the study's findings, which confirmed key hypotheses relating to the motivational benefits of gamified learning (H3), the effectiveness of blended strategies (H1, H5), the measurable impact of consistent Duolingo use on vocabulary retention (H2), and the role of teacher facilitation and digital equity in maximizing impact.

(H6). Its successful implementation depends on thoughtful integration, teacher readiness, and a commitment to digital inclusivity.

1.5 Challenges and Limitations

While this study offers useful insights into the use of Duolingo as a vocabulary-learning tool, several challenges and limitations must be acknowledged. One of the most pressing limitations is the small sample size involved in the experimental and control groups for the vocabulary tests. The limited number of participants restricts the ability to generalize the results to a broader population. Although statistically significant gains were observed in the experimental group, the small cohort prevents firm conclusions regarding the broader efficacy of Duolingo in diverse EFL contexts.

The duration of the intervention presents a second limitation. A one-week exposure to Duolingo provides only a short window into its pedagogical potential. Vocabulary acquisition is a cumulative and context-sensitive process, and the short timeframe likely constrained the depth of vocabulary development that could occur. More sustained usage would provide a clearer picture of how consistent engagement with the app supports long-term retention and expansion of lexical knowledge.

Access to technology also emerged as a limiting factor. While many students reported access to smartphones and the internet, a portion of the sample encountered difficulties due to limited data availability, device sharing, or poor connectivity. These digital access disparities risk excluding certain learners and could lead to uneven learning outcomes. As Duolingo relies on regular digital engagement, infrastructural challenges represent a significant barrier to equitable implementation.

A further limitation involves the measurement focus on receptive vocabulary knowledge. The study's instruments primarily assessed students' recognition and recall of vocabulary rather than their ability to use new words productively in speaking or writing. This limits our understanding of how well Duolingo facilitates deeper, contextualized word knowledge. Teachers also emphasized in interviews that Duolingo lacks sufficient support for productive vocabulary skills, including pronunciation, spoken fluency, and contextual application—critical competencies in comprehensive language learning.

Additionally, the study's reliance on self-reported data in the questionnaires introduces potential biases. Students may overestimate their motivation or engagement, while teachers may underestimate app usage due to limited classroom integration. Although triangulated with interview data, these perceptions are still subject to variation based on personal experience and interpretation.

Finally, the study occurred within a specific sociocultural and institutional context—Algerian high schools—where curriculum constraints, exam pressures, and infrastructural limitations may not align with the flexible, exploratory nature of mobile-assisted language learning. These contextual dynamics must be considered when interpreting the feasibility and effectiveness of Duolingo’s integration into mainstream instruction.

Suggestions for Future Research

Building on the findings and limitations of this study, future research should explore the impact of Duolingo over longer periods, ideally across a semester or academic year, to determine its sustained influence on vocabulary growth and learner autonomy. Extended studies with larger and more diverse participant samples would improve generalizability and offer richer insights into user engagement patterns.

Future investigations should also address productive vocabulary skills. While this study emphasized recognition and recall, subsequent research might use oral and written assessments to evaluate learners’ ability to apply new vocabulary in communicative contexts. This would clarify the extent to which mobile-assisted tools foster comprehensive lexical competence.

Moreover, studies should consider structured curriculum integration of Duolingo, evaluating how guided app use within formal instruction enhances outcomes compared to optional, independent use. Comparative designs—contrasting blended models with traditional-only approaches—would help determine the added value of mobile tools.

Research into teacher training is also warranted. Investigating how professional development programs equip educators to integrate Duolingo meaningfully could yield best practices and inform policy decisions. Finally, digital equity issues merit focused attention. Future research might explore institutional strategies to overcome access barriers and ensure inclusive implementation of mobile learning solutions.

Conclusion

The findings of this study affirm the potential of Duolingo to serve as a supplementary tool for vocabulary acquisition when appropriately integrated with traditional instruction. The research supports several key hypotheses, demonstrating that interactive strategies, gamified learning environments, and mobile access can enhance motivation and engagement, contributing positively to lexical development.

However, the study also highlights the importance of balance and guidance. Duolingo's effectiveness is enhanced when used alongside communicative, contextualized teaching methods and under the facilitation of informed educators. It is not a standalone solution but a resource that, when thoughtfully employed, can enrich the vocabulary learning experience and extend language exposure beyond the classroom.

By outlining both the affordances and limitations of Duolingo, this study contributes to the evolving understanding of blended learning models in Algerian EFL education. It emphasizes the need for strategic integration, professional support, and inclusive infrastructure to realize the full potential of mobile-assisted vocabulary instruction. As digital tools become increasingly embedded in educational practice, this research offers practical and theoretical insights to guide their pedagogical application.

General Conclusion

This study set out to examine vocabulary acquisition among Algerian high school EFL learners, with a particular focus on the efficacy of diverse teaching strategies and the role of Duolingo as an extracurricular, mobile-assisted learning tool. Grounded in both theoretical and practical concerns, the research aimed to (1) identify effective strategies for vocabulary instruction in the Algerian secondary school context, (2) investigate the potential of Duolingo to reinforce vocabulary retention and application, (3) assess the motivational impact of interactive and gamified learning tools on student engagement, and (4) explore both learners' and teachers' perceptions of Duolingo compared to traditional methods. These research aims were operationalized through six hypotheses, each addressing a specific pedagogical or technological dimension of vocabulary learning.

In pursuit of these objectives, the study adopted a mixed-methods research design, employing vocabulary pre- and post-tests to measure learning gains, closed and open-ended questionnaires to gather large-scale perception data, and semi-structured interviews with experienced EFL teachers to gain in-depth insights. The intervention involved one week of guided Duolingo use by the experimental group, while a control group received standard instruction without app integration. Quantitative data were analyzed using descriptive and inferential statistics, while qualitative data were examined thematically.

The results revealed a statistically significant improvement in vocabulary retention within the experimental group, affirming the pedagogical potential of short-term Duolingo use, especially when used as a reinforcement tool rather than a primary instructional method. Students expressed high levels of motivation and engagement with the app's gamified features, such as streaks, rewards, and instant feedback, confirming Hypothesis 3. Moreover, the study found that while traditional strategies like flashcards and semantic mapping were still highly valued, a blended approach that integrates mobile tools with classroom instruction was viewed positively by both students and teachers—thus supporting Hypotheses 1 and 5.

Teacher interviews and student open-ended responses added important nuance to the interpretation of these findings. Educators praised Duolingo's repetition and convenience but raised concerns about its limited capacity for developing productive skills, contextual usage, and critical thinking. They also highlighted the necessity of teacher scaffolding, curriculum alignment, and digital literacy support. These perspectives echoed the limitations identified in Hypothesis 6, which called attention to implementation challenges and the need for targeted

support to ensure the tool's effectiveness.

Despite the promising outcomes, the study faced several limitations. The sample size for the vocabulary tests was small, and the duration of the intervention was limited to one week. Additionally, infrastructural challenges—such as inconsistent internet access and limited device availability—hindered uniform implementation. The assessment focus was primarily on receptive vocabulary knowledge, leaving productive vocabulary and communicative competence less explored. These constraints affected the generalizability of the results but nonetheless provided a meaningful snapshot of Duolingo's impact in a real-world Algerian educational setting.

This study contributes to a growing body of literature that explores the intersection of traditional instruction and mobile-assisted language learning in EFL contexts. The findings reaffirm the importance of combining structured, teacher-led strategies with autonomous, technology-supported learning environments. They also underscore the role of learner engagement and motivation in vocabulary acquisition—particularly when instructional methods are diversified and aligned with students' digital habits and preferences.

Given the scope and findings of the research, it is recommended that future studies adopt a longitudinal design to evaluate the long-term effects of Duolingo use on vocabulary retention and language proficiency. Additional focus should be placed on developing learners' productive vocabulary and on investigating the integration of mobile tools within a fully communicative curriculum. Moreover, further research is needed to explore teacher-training models that support the pedagogical use of digital tools in line with national curriculum goals.

In conclusion, the study illustrates that Duolingo, when strategically implemented, has the potential to enhance vocabulary acquisition in Algerian high school EFL classrooms. It should not replace the teacher's role or communicative instruction, but rather function as a supplementary tool within a blended learning model. With careful planning, inclusive access, and sustained professional development, mobile-assisted vocabulary learning can contribute significantly to learners' linguistic development, autonomy, and engagement in English language education.

References

Al-Jarf, R. (2021). Duolingo in Arab EFL classrooms: Impacts on motivation and vocabulary retention. *Language Learning & Technology*, 25(2), 45–60.

Aulia, H. R., Wahjuningsih, E., & Andayani, R. (2020). The effect of Duolingo application on students' English vocabulary mastery. *English Language Teaching and Research Journal*, 4(2), 29–37. <https://doi.org/10.37147/eltr.v4i2.71>

Ausubel, D. P. (1968). *Educational psychology: A cognitive view*. Holt, Rinehart & Winston.

Author. (2023). *EFL Students' Attitudes towards the Use of Duolingo Language Application to Enhance their Vocabulary* [Master's thesis, Mouloud Mammeri University of Tizi Ouzou].

Author. (2023). *The Integration of Duolingo in Classroom Setting: A Case Study of its Impact on English Language Learning*.

Author. (2025). Qualitative interview data from Algerian EFL learners on Duolingo social features. Unpublished raw data.

Beatty, K. (2013). *Teaching and Researching Computer-Assisted Language Learning*. Harlow: Pearson Education.

Blanco, C. (2024, December 2). Duolingo 101: How to learn a language on Duolingo. Duolingo Blog. <https://blog.duolingo.com/duolingo-101-how-to-learn-a-language-on-duolingo/>

Boudaa, M. (2023). *Investigating the Role of the Duolingo Application in Enhancing EFL Students' Speaking Skills: The Case Study of First-year EFL Students at Mohamed Kheider University of Biskra* [Master's thesis, Mohamed Kheider University].

Brown, J. S., Collins, A., & Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18(1), 32-42.

Bruner, J. (1960). *The Process of Education*. Harvard University Press.

Bruner, J. (1990). *Acts of Meaning*. Harvard University Press.

Cardenas Leezile, B., Espinosa, G. A., & Simene, G. M. J. (2021). Assessing the

pedagogical limitations of Duolingo in English language instruction: Implications for curriculum development. *International Journal of Research in Education, Humanities and Commerce*, 6(2). <https://ijrehc.com/vol-6-issue-2/assessing-the-pedagogical-limitations-of-duolingo>

Cardeñas, L. B., Espinosa, G. A., & Simene, G. M. J. (2022). Assessing the pedagogical limitations of Duolingo in English language instruction: Implications for curriculum development. *International Journal of Research in Education, Humanities and Commerce*, 6(2). <https://ijrehc.com/vol-6-issue-2/assessing-the-pedagogical-limitations-of-duolingo>

Chapelle, C. A. (2001). *Computer Applications in Second Language Acquisition*. Cambridge: Cambridge University Press.

Chen, X., & Yang, Y. (2020). The impact of social features on user engagement in mobile language learning: A log-file analysis of Duolingo. *Journal of Computer-Assisted Language Learning*, 33(4), 325–345. <https://doi.org/10.1080/09588221.2020.1728671>

Clear, J. (2018). *Atomic Habits: Tiny Changes, Remarkable Results*. Avery.

Computer Assisted Language Learning. (2022). Special issue on mobile-assisted language learning, 35(1), 1–156.

Computer Assisted Language Learning. (2022). Special Issue on Mobile-Assisted Language Learning.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. (2011). "From Game Design Elements to Gamefulness: defining 'gamification.'" In *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments*, 9-15.

Deterding, S., Dixon, D., Khaled, R., & Nacke, L. E. (2011). From game design elements to gamefulness: Defining "gamification." *Proceedings of the 15th International Academic MindTrek Conference: Envisioning Future Media Environments*.

Dewey, J. (1938). *Experience and Education*. Kappa Delta Pi.

Elmotri, B., Osman, O., Garrouri, S., & Elyasa, Y. (2025). Unlocking language proficiency: A comprehensive comparison of Duolingo and Oxford English Coach effectiveness in language learning. *Mediterranean Journal of Social Sciences*, 16(1), 23–35. <https://doi.org/10.36941/mjss-2025-0003>

Folse, K. S. (2004). *Vocabulary Myths: Applying Second Language Research to Classroom Teaching*. Ann Arbor: University of Michigan Press.

Freeman, C., Kittredge, A., Hopman, E., & Jiang, X. (2024, July 8). Educators' perceptions of Duolingo efficacy (Duolingo Research Report DRR-24-07). Duolingo, Inc.

<https://www.duolingo.com/efficacy>

Godwin-Jones, R. (2020). Building language skills with apps: The shift towards mobile and gamified learning. *Language Learning & Technology*, 24(2), 3–9. <https://doi.org/10125/44771>

Guariento, W., & Morley, J. (2001). "Text and Task Authenticity in the EFL Classroom." *ELT Journal*, 55(4), 347-353.

Hamari, J., Koivisto, J., & Sarsa, H. (2014). "Does Gamification Work?-A Literature Review of Empirical Studies on Gamification." In 2014, 47th Hawaii International Conference on System Sciences, 3025-3034.

Hamouma, C., & Menezla, N. (2019). The impact of digital literacy proficiency on EFL students' academic writing performance: A case study of Algerian third-year EFL students. *International Journal of Digital Literacy and Digital Competence*, 10(4), 40–55.

Hmelo-Silver, C. E., Duncan, R. G., & Chinn, C. A. (2007). Scaffolding and achievement in problem-based learning environments: A qualitative review. *Interdisciplinary Journal of Problem-Based Learning*, 1(1), 3.

<https://elearning.centre-univ-mila.dz/a2025/mod/resource/view.php?id=34209&forceview=1>

Huckin, T., & Coady, J. (1999). "Incidental Vocabulary Acquisition in a Second Language." In *Second Language Vocabulary Acquisition*, edited by J. Coady & T. Huckin, 199-217. Cambridge: Cambridge University Press.

Johnson, D. W., & Johnson, R. T. (2009). An elaboration of social interdependence theory. *Psychological Bulletin*, 135(2), 281.

Jonassen, D. H. (1991). Objectivism versus constructivism: Do we need a new philosophical paradigm? *Educational Technology Research and Development*, 39(3), 5-14.

Kim, Y., & Lee, H. (2019). Breaking the streak: Emotional consequences of gamified learning interruptions. *Journal of Educational Technology & Society*, 22(3), 110–123.

Kittredge, A. K., Hopman, E. W. M., Reuveni, B., Dionne, D., Freeman, C., & Jiang, X. (2025). Mobile language app learners' self-efficacy increases after using generative AI. *Frontiers in Education*, 10, Article 1499497. <https://doi.org/10.3389/feduc.2025.1499497>

Krashen, S. D. (1982). *Principles and practice in second language acquisition*. Pergamon Press.

Krashen, S. D. (1985). *The Input Hypothesis: Issues and Implications*. Longman.

Lantolf, J. P. (2000). Second language learning as a mediated process. *Language Teaching*, 33(02), 79-96.

Lee, H., & Park, J. (2021). Skill-specific outcomes in Duolingo-based language learning. *Journal of Educational Technology & Society*, 24(3), 112–125.

Lee, S., & Park, H. (2021). Evaluating speaking outcomes in app-based learning environments: A case study of Duolingo. *Language Testing in Asia*, 11(1), 27–45. <https://doi.org/10.1186/s40468-021-00125-w>

Lewis, M. (1993). *The Lexical Approach: The State of ELT and a Way Forward*. Hove: Language Teaching Publications.

Loewen, S., Crowther, D., Isbell, D., Kim, K. M., Maloney, J., Miller, Z. F., & Rawal, H. (2020). Mobile-assisted language learning: A Duolingo case study. *ReCALL*, 31(3), 293–311. <https://doi.org/10.1017/S0958344019000232>

Long, M. H. (1991). Focus on form: A design feature in language teaching methodology. In K. de Bot, R. Ginsberg, & C. Kramsch (Eds.), *Foreign language research in cross-cultural perspective* (pp. 39-52). John Benjamins Publishing Company.

Messis, M. (2024). Applications in learning English: The case of second-year students of English at Skikda University. *ATRAS-Univ-Saida Journal*.

Nation, I. S. P. (2001). "Learning Vocabulary in Another Language." In *Teaching English as a Second or Foreign Language*, edited by Marianne Celce-Murcia, 319-327. Boston: Heinle & Heinle.

Nation, I. S. P. (2006). "How Large a Vocabulary Is Needed for Reading and Listening?" *The Canadian Thornbury*, S. (2002). *How to Teach Vocabulary*. Harlow: Pearson Education.

Nation, I. S. P. (2013). *Learning Vocabulary in Another Language* (2nd ed.). Cambridge: Cambridge University Press

Novak, J. D. (1998). *Learning, Creating, and Using Knowledge: Concept Maps as Facilitative Tools in Schools and Corporations*. Lawrence Erlbaum Associates.

Other studies on Duolingo's effectiveness can be found in academic journals focusing on language learning and technology.

Oxford, R. L. (1990). *Language Learning Strategies: What Every Teacher Should Know*. New York: Newbury House.

Palincsar, A. S. (1998). Social constructivist perspectives on teaching and learning. *Annual Review of Psychology*, 49(1), 345-375.

Piaget, J. (1972). *The psychology of the child*. New York: Basic Books.

Read, J. (2000). *Assessing Vocabulary*. Cambridge: Cambridge University Press.

Read, J. (2004). "Research in Teaching Vocabulary." In *Teaching Vocabulary*:

Strategies and Techniques, edited by J. C. Richards & W. A. Renandya, 1-24. New York: Cambridge University Press.

Rogoff, B. (1990). *Apprenticeship in thinking: Cognitive development in social context*. Oxford University Press.

Said, N. M., & Ismail, H. H. (2023). Conceptualising Duolingo and its affordances and constraints as a learning tool in ESL reading classrooms: A concept paper. *International Journal of Academic Research in Business and Social Sciences*, 13(12), 2740–2758. <https://doi.org/10.6007/IJARBSS/v13-i12/20171>

Schmitt, N. (1997). "Vocabulary Learning Strategies." In *Vocabulary: Description, Acquisition, and Pedagogy*, edited by N. Schmitt & M. McCarthy, 199-227. Cambridge: Cambridge University Press.

Schmitt, N. (2000). "Vocabulary in Language Teaching." In *The Handbook of Applied Linguistics*, edited by A. Davies & C. Elder, 200-220. Oxford: Blackwell.

Schmitt, N. (2002). "Vocabulary in Language Teaching." In *The Handbook of Applied Linguistics*, edited by A. Davies & C. Elder, 200-220. Oxford: Blackwell.

Schunk, D. H. (2012). *Learning Theories: An Educational Perspective*. Pearson Education.

Settles, B. (2013). "Duolingo: A New Way to Learn Languages." *The Chronicle of Higher Education*.

Smith, A., Nguyen, T., & Patel, R. (2020). Learner motivation in mobile-assisted language learning: Biases in self-reported app data. *CALL-EJ*, 21(2), 34–49.

Smith, B., Jiang, X., & Peters, R. (2024). The effectiveness of Duolingo in developing receptive and productive language knowledge and proficiency. *Language Learning & Technology*, 28(1), 1–26. <https://hdl.handle.net/10125/73595>

Smith, R., Jones, A., & Patel, S. (2020). Streak loss and dropout rates in gamified education apps. *Computers & Education*, 145, Article 10374

Swain, M. (1985). Communicative competence: Some roles of comprehensible input and comprehensible output in its development. In S. Gass & C. Madden (Eds.), *Input in second language acquisition* (pp. 235-253). Newbury House.

Sweller, J. (1988). Cognitive load during problem solving: Effects on learning. *Cognitive Science*, 12(2), 257-285.

Taub, R., Westra, D., Benhegua, A., Cardenas, L., Jiang, X., & Sewall, J. (2021). Evaluating the reading and listening outcomes of beginning-level Duolingo courses. *Foreign Language Annals*, 54(4), 974–1002. <https://doi.org/10.1111/flan.12600>

Tockwell, G. (2010). "Using Mobile Phones for Vocabulary Activities: Examining the Effect of the Platform." *Language Learning & Technology*, 14(2), 95-110.

Ur, P. (1996). *A Course in Language Teaching: Practice and Theory*. Cambridge: Cambridge University Press.

Vesselinov, R., & Grego, J. (2016). "Duolingo Effectiveness Study." City University of New York.

Vesselinov, R., & Grego, J. (2016). Duolingo effectiveness study. City University of New York. <https://www.duolingo.com/efficacy>

Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Harvard University Press.

Woelke, M. (2023). The effects of Duolingo, an AI-integrated technology, on EFL learners' willingness to communicate and engagement in online classes. *International Review of Research in Open and Distributed Learning*, 25(4). <https://doi.org/10.19173/irrodl.v25i4.7677>

Wood, D., Bruner, J. S., & Ross, G. (1976). The role of tutoring in problem-solving. *Journal of Child Psychology and Psychiatry*, 17(2), 89-100.

Appendices

1. Appendix A: Request for permission to conduct research

Hanine Mansouri

Biskra, Algeria

Email: mansourihanine2@gmail.com

May 17, 2025

To Whom It May Concern,

Subject: Request for Permission to Conduct Research on Vocabulary Acquisition Using Duolingo among EFL Learners

I, Hanine Mansouri, a master's student at Mohamed Kheider University – Biskra, Faculty of Letters and Foreign Languages, Division of English, am conducting a research study entitled “Exploring Vocabulary Acquisition in EFL Learners: Effective Teaching Strategies and the Role of Duolingo as an Extracurricular Tool.” This study is part of the Master in Sciences of Language program, under the Ministry of Higher Education and Scientific Research.

The purpose of this research is to investigate how the use of Duolingo impacts vocabulary acquisition among Algerian EFL learners and to explore effective teaching strategies in this context.

I respectfully request permission to conduct this study within your institution, involving voluntary participation of EFL learners and teachers affiliated with your organization. The research will include vocabulary pre- and post-tests for learners, semi-structured interviews with teachers, and the distribution of questionnaires. All procedures will be designed to cause minimal disruption to regular academic activities.

I guarantee that participants' confidentiality and anonymity will be strictly upheld throughout the study. The data collected will be used solely for academic research and will not reveal any personally identifiable information in any reports or publications.

Your approval to facilitate this research would be greatly appreciated and will contribute significantly to educational development in Algeria.

Please do not hesitate to contact me should you need any additional information.

Thank you very much for your consideration.

Sincerely,

Hanine Mansouri

Email: mansourihanine2@gmail.com

2. Appendix B : Questionnaires and Test Links

[Students questionnaire](#)

[Teacher's questionnaire](#)

[Pre Test](#)

[Post test experimental group](#)

[Post test control group](#)

3. Appendix C: Semi-structured Interview Questions

Semi-Structured Interview Questions for EFL Teachers

Section 1: Instructional Strategies for Vocabulary Acquisition

Can you describe your typical approach to teaching English vocabulary in the classroom?

What instructional strategies do you find most effective for vocabulary acquisition among EFL learners?

How do you select vocabulary items to teach, and what factors influence your choices?

In what ways do you assess students' vocabulary learning and retention?

Section 2: Perceptions of Duolingo as a Language Learning Tool

Have you used Duolingo in your teaching practice? If yes, in what context?

What are your general perceptions of Duolingo as a vocabulary learning tool for EFL students?

In your opinion, what are the strengths and limitations of using Duolingo in vocabulary instruction?

Do you believe Duolingo aligns with your instructional goals? Why or why not?

How do your students respond to using Duolingo or similar language learning applications?

Section 3: Challenges Learners Encounter in Acquiring Vocabulary

What are the most common difficulties your students face in learning and retaining new vocabulary?

Are there specific types of vocabulary (e.g., academic, idiomatic) that students find more challenging?

How do you currently support students in overcoming these challenges?

Do you think Duolingo helps address any of these vocabulary learning challenges? Why or why not?

4. Appendix D: Informed Consent Form

Title of the Study: *Exploring EFL Teachers' Instructional Strategies, Perceptions of Duolingo, and Learner Challenges in Vocabulary Acquisition*

Researcher: [Your Name]

Institutional Affiliation: [Your University or Institution]

Contact Information: [Email/Phone]

Introduction and Purpose

You are invited to participate in a research study that aims to explore the instructional strategies used by EFL teachers, their perceptions of Duolingo as a language learning tool, and their insights into the challenges learners face in acquiring vocabulary.

Procedures

If you agree to participate, you will take part in a semi-structured interview lasting approximately 30–45 minutes. The interview will be audio-recorded with your permission and later transcribed for analysis.

Voluntary Participation

Your participation is voluntary. You may decline to answer any question or withdraw from the interview at any time without penalty.

Confidentiality

All information provided will be kept strictly confidential. Your identity will be anonymised in all reports and publications resulting from this research. Audio recordings and transcripts will be securely stored and accessible only to the research team.

Risks and Benefits

There are no foreseeable risks to participating in this study. While there may be no direct benefits to you, your responses will contribute to a better understanding of vocabulary instruction and the role of educational technologies like Duolingo in EFL contexts.

Consent

By signing below, you indicate that you have read and understood the information above and agree to participate in this study.

Participant Name: _____

Participant Signature: _____

Date: _____

Researcher Signature: _____ **Date:** _____

مستخلص الدراسة

تدرس هذه الدراسة اكتساب المفردات بين طلاب المدارس الثانوية الجزائرية الذين يتعلمون اللغة الإنجليزية كلغة

كأداة رقمية خارج المنهج الدراسي. Duolingo ، مع التركيز بشكل خاص على الاستخدام التكميلي لتطبيق (EFL) أجنبية تم استخدام تصميم مختلط، يتضمن اختبارات مفردات قبل وبعد، واستبيانات منظمة تم توزيعها على 51 طالبًا و 43 معلمًا للغة الإنجليزية كلغة أجنبية، ومقابلات شبه منظمة أجريت مع خمسة معلمين من بيئات تعليمية متنوعة. أشارت النتائج إلى تحسن ذو دلالة إحصائية في درجات المفردات داخل المجموعة التجريبية بعد أسبوع من استخدام تطبيق دولينجو ومع ذلك، لم تسفر المقارنات بين المجموعتين التجريبية والضابطة عن اختلافات ذات دلالة ($p = .009$). ، مما يشير إلى تأثير محدود في تمييز تأثير دولينجو عن التعليم التقليدي وحده. أفاد الطلاب بتحفيز ($p = .170$) إحصائية ومشاركة عالية، حيث أشار 82.5% إلى وجود خبرة سابقة مع تطبيق دولينجو و 77.5% استجابوا بشكل إيجابي لعناصره المخصصة للألعاب. بينما تم تقييم الأدوات التقليدية مثل بطاقات الذاكرة بشكل عالٍ، تم استخدام الاستراتيجيات القائمة على الوسائط المتعددة بشكل أكثر تكرارًا. عبر المعلمون عمومًا عن معرفتهم بتطبيق دولينجو لكنهم أشاروا إلى انخفاض استخدام الطلاب له وأبدوا مخاوفهم بشأن تركيزه المحدود على المهارات الإنتاجية وتوافقه الجزئي مع أهداف المنهج الدراسي. أبرز التحليل الموضوعي تفضيلات الطلاب للتعلم التفاعلي والمتنوع، بالإضافة إلى تركيز المعلمين على الأساليب السياقية والتواصلية. التحديات الرئيسية شملت الوصول غير المتسق إلى التكنولوجيا الرقمية ونقص التدريب. تخلص الدراسة إلى أن تطبيق دولينجو، عند دمجها بشكل مدروس ضمن ممارسات الفصل الدراسي التفاعلية، يمكن أن يدعم تعلم المفردات وتحفيز الطلاب.

الكلمات المفتاحية: اكتساب المفردات، دولينجو، متعلمو اللغة الإنجليزية كلغة أجنبية، التعلم المدعوم بالهاتف المحمول، التعليم التفاعلي المحفّز.